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J. R. MOHLER R. A. ARCHIBALD

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PIERRE A. FISH, Editor **ITHACA, N. Y.**

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Communications relating to membership and matters pertaining to the American Veterinary Medical Association should be addressed to Acting Secretary L. Enos Day, 1827 S. Wabash Ave., Chicago, Ill. Matters pertaining to the Journal should be sent to Ithaca, N. Y.

ANNOUNCEMENT

"The pen is mightier than the sword," but we have resigned the pen to enter the military service. At this writing we are unable to announce definitely who our successor will be; but we bespeak for him the kind indulgence and hearty cooperation that has been accorded us.

In changing the office of publication and transferring the equipment, there is likely to be some delay in the date of publication. For this delay, under the circumstances unavoidable, further indulgence must be asked.

It has been our aim to make the JOURNAL the organ of the veterinary profession as well as the organ of the American Veterinary Medical Association. For whatever measure of success we have attained, we wish to render our due appreciation and thanks to the members of the profession and association, through whose cooperation success has been possible. P. A. F.

THE FIFTY-FIFTH ANNUAL MEETING OF THE A. V. M. A.

The choice of the place for the fifty-fifth annual meeting of the association was very fitting. In these days when, in addition to the purpose to benefit from the program of such a meeting, it is desired to keep up the spirit of patriotism among our members no other place than Philadelphia could have been better chosen. The birth place of our Liberty holds much that is dear to the mind of Americans. Independence Hall, the "Betsy Ross" house, and many other places of historical interest take on special significance in these times. The veterinarians and their friends who visited Philadelphia could not help but take away a deeper consecration to the cause that holds the minds and hearts of all liberty loving mankind. As one of the centers of veterinary learning and things that pertain to veterinary medicine the place of meeting was a happy choice. Meetings in connection with the business of the association began as early as Saturday. The executive board, by early sessions, cleared the way to handling the great mass of business to be brought before the members. On Sunday afternoon the Association of State and Provincial Veterinary Colleges met in the "Red" room of the Bellevue-Stratford. The attendance at this meeting was good and the interest in the numerous reports and papers was of high order. Following the president's and secretary's reports there were committee reports and papers on such subjects as entrance requirements, curriculum, faculty, teaching, histology, physiology, diagnosis, parasitology, pathology and bacteriology, therapeutics. Major Fish introduced Captain F. C. Waite of the Surgeon General's office, who talked upon the subject of entrance requirements. Captain Waite added much to the general program on Monday by his discussion on "Requirements for Enlistments for Veterinary Students in the Enlisted Medical Reserve Corps". Most of the discussion in this section centered upon entrance requirements, teaching the fundamentals such as histology and the knowledge and skill of the teachers. It is to be inferred from the general discussion that the section work is too general and that not enough in the way of specific recommendation has been given.

The fifty-fifth annual meeting of the American Veterinary Medical Association was called to order by the president, F. Tor-

rance, in the ball room of the Bellevue-Stratford. After the invocation the members sang one verse of the Star-Spangled Banner, the Canadian National Anthem, and the French National Anthem. The Hon. E. J. Cattell gave the address of welcome for the Mayor of Philadelphia. Dr. V. A. Moore, for the association, gave a pleasing response to Mr. Cattell. Part of the report of the executive board was given at this session and was amplified in later sessions.

The program for Monday afternoon was divided into three sections. One was almost a symposium on swine diseases, another section was a symposium on parasitic diseases, and the third section dealt entirely with matters of veterinary education. The rest of the program was in joint session. Tuesday morning was given over to army veterinary relationships. Major Turner and Dr. Mohler were the only men scheduled who were able to appear in this session. The papers given by these two men were of great value to the association. Dr. V. A. Moore and Mr. J. J. Ferguson gave the papers of the afternoon. These two men completed the literary part of Tuesday's program. The rest of the day was given over to business and the election of officers. Wednesday furnished its quota of good papers. The afternoon session, which was a symposium on contagious abortion, showed a lack of agreement in the association upon the subject and the president was authorized to appoint a committee to report at the next annual meeting. Only two papers were read on Thursday morning. The rest were read by title. Business and the clinic in the afternoon completed the work of the association. The association made it hard to conform to the constitutional limitations as applied to papers and discussions. More might be accomplished in the meetings if these limitations were lived up to.

It was voted to add another district to the jurisdiction of the executive board. About 1000 new members were elected to membership. Of this large list a very large number came from the B. A. I. and the Veterinary Corps of the Army. It was deemed wise to form a section in the association to be known as the B. A. I. section. A large sum of money was set aside to be invested in equal proportions in war bonds of Canada and the United States. The sum of $2500 was appropriated from the funds of the Allied Veterinary Relief Fund to be sent to Prof. Vallée of Alfort, France, and to be used for the relief of indigent veterinarians in

the allied armies. A little over $5000 was reported in this fund by Dr. T. E. Smith, the treasurer, It was voted that a committee be appointed to establish a Liautard Memorial. The resignation of Major P. A. Fish as editor of the JOURNAL OF THE A. V. M. A. having been accepted Dr. Dalrymple of Louisiana was elected in his stead. An amendment to the constitution was offered by Dr. N. S. Mayo which would combine the office of secretary and the editorship. Dr. W. H. Dalrymple of Louisiana invited the association to New Orleans for the meeting in 1919. This was referred to the executive committee with the recommendation that the invitation be accepted.

Dr. V. A. Moore of the New York State Veterinary College at Cornell University was chosen as the next president. Dr. N. S. Mayo was elected secretary and Dr. M. Jacob was elected treasurer. $1000 was appropriated for the use of the legislative committee during the coming year..

An impressive ceremony in the course of the meeting was the presentation by Dr. Eagle of the portraits of Dr. Salmon, Dr. Melvin, and Dr. Mohler to be hung in the art gallery of the Saddle and Sirloin Club, space having been set aside in that gallery for the portraits of veterinarians who have given valued service to the livestock industry. It was voted on behalf of the association to accept the portraits and that they be presented to the club at the December meeting of the Live Stock Sanitary Association.

Mr. E. S. Bayard, editor *National Stockman and Farmer,* and Mr. J. J. Ferguson were elected by unanimous vote to honorary membership in the A. V. M. A.

The stay of the society in Philadelphia was not entirely given over to business. Monday evening we had the pleasure of attending the president's reception in the ball room of the Bellevue-Stratford. Tuesday evening there were alumni and class meetings. Wednesday evening the annual banquet was held in the ball room of the Bellevue-Stratford. Major P. A. Fish acted as toastmaster. The speakers were Mrs. A. T. Kinsley for the ladies, Hon. E. J. Cattell, Mr. E. C. Bayard, Mr. W. Freeland Kendrick, and Dr. V. A. Moore. On Thursday afternoon there was a boat ride on the Delaware to Wilmington. Of especial interest on this trip was the great Hog Island shipyard. To Mulford's is due a vote of thanks for the splendid trip and also the opportunity that many of the members availed themselves of to visit the Mulford plant at Glenolden.

C. E. HAYDEN, Ithaca, N. Y.

DISEASES INTERFERING WITH REPRODUCTION IN CATTLE AND THEIR SIGNIFICANCE TO THE STATE*

W. L. WILLIAMS, Ithaca, N. Y.

Some three years ago, I estimated that the infection responsible for contagious abortion in cattle was causing an annual loss in the State of New York of ten million dollars. In 1916, the Secretary of Agriculture estimated the losses from contagious abortion in the United States at twenty millions, just below the losses from tuberculosis, estimated at twenty-five millions. It is evident that either there was a great divergence of opinion in the two estimates or New York had a grossly unjust share of the losses—one-half the total in the nation. The cattle of New York are as healthy as any group of dairy cattle of equal concentration and under similar climatic conditions to be found in America or in the world.

Statistics regarding chronic infectious diseases are inevitably inexact. If an acute disease, as hog cholera, breaks out in a herd of one hundred swine, and fifty die, the owner knows he has lost fifty per cent by death and has incurred further loss in the condition of the recovered animals and in other ways. He can compute his losses upon quite a secure basis. In a chronic disease, the owner does not know when it began, cannot diagnose the disease in all the affected animals, and does not know when or how the disease will end.

Among all chronic diseases, estimates and statistics upon the contagious abortion of cattle are most subject to error and most liable to mislead. The fundamental difficulty is that there is no generally accepted definition. The original, and unquestionably still the most popular conception of contagious abortion in cattle is the observed disaster of the expulsion of a dead fetus. Careful researches seem to indicate that approximately one-half the embryos and dead fetuses are expelled unobserved. Many calves also are born prematurely or at full term which are more or less seriously involved in the same infection, and they too are excluded from the statistics upon contagious abortion.

My conception of contagious abortion of cattle differs radically

*Presented at the N. Y. State Agricultural Society, Albany, N. Y., Jan. 16, 1918.

from that commonly prevailing. I have defined contagious abortion as a virtually universal infection of the genital and other organs of cattle which, under favorable conditions, induces no recognizable disease, but when virulent may induce sterility, abortion, premature birth, and, with these or with birth at full term, a metritis or inflammation of the uterus or womb, frequently complicated with retained afterbirth. Further, the infection within the uterus underlying these disasters, if it does not kill the fetus, nevertheless invades it, and frequently induces, before or shortly after birth, such diseases, or rather symptoms of disease, as calf scours, pneumonia, etc. This radical difference in the conception of contagious abortion is the probable explanation for the wide divergence between the estimated losses from contagious abortion made by the Secretary of Agriculture and by me.

Whatever conception of contagious abortion is held, it is wellnigh impossible to secure accurate data upon which to base estimates of losses. If it is attempted to base estimates of losses upon the number of observed abortions, the foundation is insecure. The ordinary farmer or dairyman remembers an abortion for only an astonishingly short time. The majority of farmers having dairy herds of ten cows, in which one cow aborts every two years for ten years, will not recall many of the abortions at the close of the ten-year period. Yet he has lost by abortion five per cent of his calf crop. Records are not ordinarily kept in grade herds. In pure-bred herds, the records of living calves at age for registration is essential. Many breeders make notes of abortion, and some of retained afterbirth. Incidentally, the number of calves registered in the official herd book might indicate the practical reproductive efficiency, if it were known how many females of breeding age were in the herd, but this is only rarely known, and, so far as I have observed, never publicly stated.

There are in the United States, in connection with agricultural schools and colleges and experiment stations, a great number of dairy herds kept for research and teaching. The authorities report frequently the records made by individual cows, the average milk and butter yield in a given time for all cows in milk in the herd, the amount and cost of foods used in producing such records, etc., but the management of no public herd, so far as I have discovered, has ever recorded any data to indicate the reproductive efficiency. Apparently, if one cow in such a herd makes thirty pounds of

butter in a week, the management considers that success, even though one of her associates aborts and yields essentially no milk, another has retained afterbirth and dies, and a fourth is sterile for the year or forever. The yield of thirty pounds of butter by one of the four cows does not save the group from bankruptcy.

For obvious reasons, private owners of registered cattle do not report the vital statistics of their herds. The breeding efficiency in all large herds is such that accurate vital statistics, if published, would place the herd at a disadvantage with all other herds whose owners rest their case upon the general statement that they have no sterility, abortion, premature birth, retained afterbirth, calf scours, or calf pneumonia. Viewed from the standpoint of observed abortions alone, among the few herds from which I have been able to secure reasonably accurate data over a period of years, the abortion rate has ranged as high as seventeen per cent and has not fallen below ten per cent. The abortions have always been highest in heifers—usually in first, though sometimes in second pregnancy. In those herds where heifer calves are regularly grown in considerable numbers and enter the breeding herd at the rate of ten or more annually, the abortion rate in first pregnancy over a series of years frequently reaches thirty to fifty per cent, and has not fallen below twenty per cent in any herd from which I have been able to obtain data over a period of eight to ten years.

In smaller herds, especially where but few heifers are grown, the abortion rate is apparently much lower. The average rate of abortion in dairy cows certainly exceeds five per cent. If the dairy cows of New York number 1,500,000, and five per cent are known to abort annually, the total abortions in the state number 75,000. In many localities, dairymen can sell a large new-born calf for five dollars, to be grown for veal. Calves of the smaller breeds are not so valuable for veal, but high-grade heifer calves are much more valuable and the values of pedigreed calves of either sex mount into thousands. It would appear very conservative to place the loss of the aborted calves alone at an average of five dollars each—a total of $375,000 per annum.

It is reasonable, according to my observations, to say that two per cent of aborting cows die—a total of 1500 animals, which, at $75.00 each, amounts to $112,500.

Not less than ten per cent of observed aborters become permanently sterile and have to be sent to the butcher, at an average loss of probably thirty dollars each—a total of $225,000.

I have estimated that two per cent of aborters die. The dairying efficiency of the remaining ninety-eight per cent, or 73,500 cows, which abort is probably reduced fifty per cent for the prospective lactation period. In order to be safe, let the estimated loss be thirty per cent of the milk flow, considering the normal lactation as twenty-five pounds per day for three hundred days, or a total of seven thousand five hundred pounds.

The cow which aborts loses thirty per cent—2250 pounds—of milk, worth two cents per pound, or $45 for each aborting cow—a total loss in value of milk of $3,307,500.

Those cows which do not die or become permanently sterile do not breed promptly. High dairying efficiency demands that a cow calve once every twelve months. Every month that a cow exceeds this period between calves is, on the average, a total loss to the dairyman. On the average cows which abort and breed again probably run over at least two months, or there is a period of fourteen months between two calvings, and if a cow's keep is estimated at five dollars per month, or ten dollars for the two months in the one year, there is a further total loss of $735,000.

These various items total $4,755,000, as the estimated annual losses caused by observed abortions in New York. Upon this basis, my figures are still far in excess of those of the Secretary of Agriculture, who estimates the total for the United States at $20,000,000. New York possesses about seven per cent of the dairying cattle of the nation. Consequently, her pro rata of the loss should be $1,400,000, instead of $4,755,000.

If the common conception is accepted of limiting the term "contagious abortion" to those losses due to observed abortions in cows and the immediate consequences, my estimate of ten millions annually for New York is apparently too high. If my conception of what constitutes the infection of contagious abortion is accepted, the estimate becomes entirely too low. Under the broader conception, most of the losses from sterility in cows not observed to abort must be added. The data I have been able to obtain indicate that five per cent of heifers fail to conceive, or conceive and abort unseen and are sold to the butcher as sterile, and that approximately as high a percentage of sterility prevails among cows of all ages. In other words, approximately five per cent of the cows and heifers of breeding age go to the butcher each year because of permanent sterility. Retained afterbirth plays a conspicuous part in causing

sterility, whether the cow has aborted, calved prematurely, or calved at full term. Retained afterbirth causes many deaths, and when at all severe either seriously injures or wholly ruins the milk production during the involved lactation period.

One of the most stupendous and very largely unrecognized losses of dairymen is temporary sterility, or delay in conception. It has been stated that the highest dairy efficiency calls for healthy calving once in each twelve months. Pursuant to this plan, the dairyman or breeder ordinarily breeds a cow at the first opportunity between fifty and eighty days after calving. If she fails to become pregnant within ninety days after calving and must be bred several times, if she is an average cow, it means that she must run dry for an undesirably long period, or her milk yield must be extremely low over a long period. Besides, and especially in registered cows, there is a diminution in the number of calves. The cost of this delay, falling singly, cow by cow, attracts little attention; studied carefully, the losses are staggering. If estimates are based upon one calving each twelve months and each cow is expected to be dry two months, a cow is actually at remunerative efficiency eighty-three per cent of the time. If conception is delayed one month, the efficient milking period is reduced to seventy-seven per cent of the time—a reduction of six per cent. It is probably safe to say that upon the average dairy cows calve once in thirteen months, instead of once in twelve months, and must be kept one unprofitable month in excess of the two dry months estimated as judicious before calving. If it is assumed that keeping a dry cow costs five dollars a month, and that each of the one and one-half million dairy cows are fed for one useless month for each lactation period, the item is one of $7,500,000 for the state.

It is slowly becoming recognized by veterinarians and breeders that the infection within the uterus, which may cause sterility, abortion, retained afterbirth, and other disasters to the cow, frequently passes from the uterus to the fetus prior to birth. Immediately after birth, the infection from the uterus of the diseased cow may flow down along the tail, thighs, and udder to the teats and be taken with the milk by the calf, to constitute the fundamental cause of scours and pneumonia. These cause the death or serious deterioration of a vast number of calves. In the largest herds of the best breeding cattle, the losses are frequently total for months at a time, and losses of thirty to forty per cent for sev-

eral years in succession are by no means rare. Therefore, the deaths are most keenly felt in valuable calves which it is desired to grow for breeding and dairying purposes. In the State of New York, the deaths of calves from this disease probably exceed 100,000 annually. Considering that a large proportion of them are highly bred and valuable for breeding purposes, it is safe to estimate the losses from this cause at more than one million dollars.

If this broader conception of contagious abortion—or whatever it may be called—is accepted, but brief study is required to show that the estimate I have made of $10,000,000 annual losses is none too high. Such estimates dictate also a reversal of position between tuberculosis and abortion, with regard to the monetary losses caused by each. Abortion is unquestionably the more expensive disease, by far, and it is an open question which of them is the greater menace to human health.

What do these losses signify to the State? A careful study of this disease, or group of diseases, shows that it involves by far the most seriously the large herds of highly pedigreed cattle. From these the most cows are sent to the butcher for sterility; here the most is expended in keeping a sterile cow for months or years, in the hope, not always realized, of ultimately having her breed; here retained afterbirth is commonest; and here also scours and pneumonia take the most frightful toll in the death of calves.

The losses fall primarily upon the cattle owners. In many instances they are men of independent weath, who take up the breeding of highly pedigreed cattle as a sport or for idealistic reasons and have ample incomes from other sources to maintain the herd, regardless of its essential bankruptcy. Ultimately the State must meet the losses. The great breeding herds are the logical source of supply of valuable breeding stock for the improvement of the common cattle. Without such sources where scientific breeding is nurtured, the common cattle cannot keep up that constant advance in efficiency ever demanded by the State. Each year the cost of cattle food and of labor advances, and just as surely the efficiency of dairy cows must keep pace, or the owner must fail. The world war has found the dairies of America inefficient, just as it has found many, if not all our industries. Few industries are being more sorely tried. The embarrassments are numerous and serious. Complaints regarding the industry are heard on all sides. The consumer complains of the high cost, the producer complains of the

ruinous costs of food and labor, and health boards criticise the high bacterial count in the milk and the unsanitary conditions in the dairy. The official veterinary service kills, quarantines, and otherwise interferes with the movements and uses of cattle by their owners. Dairymen complain that dairying does not and cannot pay, and are said to be dispersing their herds; breeders of pure-bred cattle complain even more seriously, and are dispersing and scattering to the winds great herds of vast economic possibilities to the State. Public-spirited men are busying themselves in efforts to check the scattering and destruction of valuable cattle, but are not wholly successful. The fact is that the world war is testing both cattle and men. We all hear that thousands of valuable dairy cattle are being sent to the shambles. Personally, I have seen no accurate data upon the point. Unquestionably, great numbers of dairy cows are being slaughtered, but just how efficient they are in the dairy is not revealed. How many cows free from tuberculosis and yielding thirty pounds of milk with 4.5 per cent of butter fat daily are being sent to the shambles? I doubt that many such cows are being sold. I have examined thousands of dairy cows in abattoirs, but am not accustomed to seeing there highly efficient dairy cows in full flow of milk.

Possibly the reports mean rather that cows which have a high potential dairying value are being slaughtered. This is doubtless true, and in this field many lamentable errors are made—and made in both directions. I recall a highly valuable cow which had been bred many times, but was apparently incurably sterile. Being dry, she was butchered, and was found pregnant. Evidently this was not so much a want of prudence as of knowledge. The opposite error is equally common. A notable cow in the State of New York made a world's butter-fat record and was sold for $10,000. At once she became sterile. After four years of effort, she became pregnant and dropped a fine bull calf potentially worth the cost of the cow. The calf died when a few days old from scours, and the cow is again sterile. There has been a very considerable expense added to the original cost of the cow. In each of these cases, there has been serious loss to the owners. However, the loss is not limited to the owner. The $10,000 cow, with a butter record of more than forty pounds per week, was quite as much an asset of the State as of the owner. The progeny of such a cow is needed for breeding up less efficient cattle. Her failure to reproduce living

young, and her failure to yield milk, is a State loss. The ten thousand dollars lost through this cow are paid ultimately by the users of dairy products, veal, and beef.

A serious financial burden falls upon the small dairyman when he goes to the great breeding herds for purebred sires for grading up his stock. Each high-producing cow which aborts, and each calf from a high-producing dam which dies of scours or pneumonia, adds to the price of the bull he must buy. If each thirty-pound cow would produce a healthy calf annually, the market price of calves from thirty-pound cows would drop. If the breeding powers of each thirty-pound cow could be preserved to eighteen years of age or over, and she would produce sixteen calves, such highly efficient cattle would multiply rapidly. In herds from which I have been able to secure reasonably good data, the cows have produced upon an average about three live calves each. In small herds, the average is perhaps a trifle higher, but does not exceed, so far as I can determine, an average of four calves per cow. That is, the average dairy cow does not live to six years of age and produce a calf each year beginning at two years. The average dairy cow fails to reach the prime of dairy life, but dies or is sold before six years old because of inefficiency. Part of such inefficiency is clearly fundamental, and the animal fails in the dairy in spite of good health. Far more heifers and young cows are discarded owing to disease which greatly lowers or wholly destroys their efficiency.

In another respect, it is a serious matter for the small dairyman to go to a large herd for breeding stock of either sex to introduce into his dairy. The abortion group of diseases has become so intense and widespread that the dairyman must incur a severe risk of introducing a more intense type of infection into his herd than that which already exists. Careful observations indicate very strongly that animals procured for breeding purposes from extremely badly infected herds may be followed by a trail of disaster wherever they go. The complaint from this standpoint is growing as we learn more and more of the nature of these diseases, and it is becoming of greater importance each year that the large breeder shall be more vigorous and more careful to preserve the soundness of his herd. The small dairyman can make very scant progress by going to the breeder of valuable cattle and securing a sire which is so badly infected that he will cause serious losses in the herd.

Neither can the small diaryman well afford to breed his cows to a valuable sire in a neighboring herd which is virulently infected.

In another respect the question of this group of diseases is highly important. Whenever a cow aborts, calves prematurely, or calves at full term and has retained afterbirth, there occurs for a longer or shorter period a voluminous and highly repulsive discharge from her genital organs. Part of this, flowing down along the tail, thighs, and udder, eventually gets into the milk. No definite disease of the human family has been traced to this source, but grave apprehensions are being aroused that this filth may interfere very seriously, in a variety of ways, with human health. The belief cannot be avoided that these discharges are injurious to human health, though to what extent and in what manner we do not know at present. The malignant sore throat of man is attributed wholly to contaminated milk, though in just what manner this contamination occurs is not known. Various writers on human medicine have suspected that diseases of the tonsils and adenoids are due to milk infection, and some writers suspect that infection from the use of cow's milk may play a part in the production of abortion and other diseases of the genital organs of woman.

The State is especially interested in the fact that the diseases of the genital organs of cattle, by lowering enormously the reproductive and dairying efficiency, increase correspondingly the cost of milk and of veal and beef. Every pound of milk produced pays a toll to disease. The cost of cattle diseases is rarely fully recognized. In order of importance, the average dairying expenses are food, labor, and disease, with disease crowding labor closely and not infrequently taking precedence. The State is also intensely interested in these diseases from the standpoint of human health.

The State Agricultural Society has a special interest in this great problem. Agriculture needs cattle—and especially dairy cows—for maintaining the fertility of the soil. The climatic and soil conditions of the State of New York render this problem of supreme importance. The decrease in the number of dairy cows in the State which is now going on is a serious blow to the productiveness of the soil. Therefore, if for no other reason, agriculturists should do everything in their power, as a body, to maintain and increase the number of dairy cows.

Throughout the history of our race, cow's milk has contributed the chief food of children, and milk and other dairy products have

constituted a leading food of adults and of the aged. Dairy products excel among all human foods, in economy, efficiency as nutrients, and healthfulness, when procured from healthy cows and kept under sanitary conditions. The human race has subsisted for so long largely upon dairy products as a staple food that it is impossible to turn from them. The growth of our cities is constantly demanding more and more milk. The metropolis is reaching out for hundreds of miles—about as far as milk can be economically or safely transported—in order to get an adequate milk supply. In spite of this, the number of dairy cows decreases, and now in the world war every dairy herd is being severely tried, and wherever a cow is inefficient she must be sacrificed for economic reasons. Unfortunately, many of these cows are not fundamentally inefficient, but are inefficient because of preventable disease. This makes the present rapid decrease in dairy cows all the more deplorable. No one can seriously blame a dairyman for selling a dry cow which was not efficient because of retained afterbirth during her last lactation period and will not calve for several months. He knows too well that she may abort or again have retained afterbirth after she has cost a large sum for food.

War conditions demand efficiency in every walk in life. This is just as true of dairying as it is of the making of ammunitions or of any other industry. If a cow fails, she must go, even though the failure is due to ignorance or carelessness on the part of the owner. It is the failure—not the potential worth of the cow—which must decide the question. Possibly the present conditions may lead to great good by thoroughly awakening the dairyman and the State to the condition of affairs and leading to some efficient measures for overcoming the evil.

Up to the present, there has been great confusion regarding the conditions necessary for the control of this disease. Generally, dairymen and breeders have taken the matter very lightly except when a storm breaks in their herds and a large per cent of their cows abort or nearly all their calves die, and the milk production is reduced alarmingly. Then they suddenly take alarm and appeal for some rapid and cheap aid. Consequently they resort to various patent medicines—some quack cure-all—in an effort to overcome a chronic infection which has existed in their herds for years and has only recently become visible to them by a great increase in its virulence. When the storm has swept by, they again lapse into forget-

fulness and fancied security until the infection again gathers force and they again have very serious losses.

One of the greatest difficulties in the situation is to have the dairyman and breeder recognize the scope of the disease as it has been outlined. The average man insists upon regarding abortion as one disease, sterility as another, retained afterbirth as a third, and calf scours and pneumonia as a fourth and fifth: they refuse to consider them as the varying symptoms of one great infection. If they could but once come to a realization of the relationship existing between them, a great step in advance would be made. They would recognize the fact that the infection exists in essentially all herds: that some herds are so slightly infected that no recognizable harm is produced, and that other herds are so severely infected that there is appalling destruction. Still more important, they should recognize that, with the knowledge now available, they may by proper measures reduce the losses very greatly, within economic bounds.

The breeders of purebred cattle should especially be brought to recognize the fact that their herds are the great centers for the nurturing and distribution of chronic diseases. From the large purebred herd, stock for breeding purposes radiates out in every direction. If diseased, these animals are capable of carrying such infections and disseminating them widely. It should be recognized as a moral crime for a breeder to sell knowingly highly infected animals to go into other herds. According to the views expressed, he cannot sell animals absolutely free from this infection, so far as known, nor, if he could do so, could they go into smaller dairy herds which are free. It is possible, however, for him to sell animals so nearly free from the infection that the degree of infection will compare favorably with that in the herds to which they are to go, and breeding may go forward without visible disease.

It has been suggested by numerous veterinarians and others that contagious abortion should be named among the contagious diseases of cattle coming under the control of the State Veterinarian or other veterinary police authority, so that animals so infected may be subjected to quarantine or other restrictions. Such laws have been enacted in a few countries. So far as known, they have accomplished no good. Such attempts at control are exceedingly imprudent, and unfortunate for the State, as well as for the dairyman and breeder. Too little is known of the disease for it to

be handled equitably and safely by legal restrictions. However, there are constant mutterings regarding such restrictions, and it would be well indeed to take note of these complaints and try to control the infection in a herd as far as the present knowledge of the disease will permit.

The State should do its utmost to increase the sum of the knowledge of the disease and to transmit that knowledge to veterinarians, breeders, and dairymen. It cannot be hoped that dairymen or breeders, working upon their own initiative, will materially advance our knowledge of the disease. The study of the disease has been considered entirely too much the business of the owner of the dairy or breeding herd. Individual dairymen can do little to learn the true character of the disease and the means of prevention. The work must be done through co-operation, and the co-operation must be had through the agency of the State. The State is capable of improving the situation in a variety of ways:

(1) By educating and distributing throughout the State an adequate number of competent veterinarians, thoroughly versed in the latest knowledge regarding the diseases of cattle and ready to aid the dairymen and breeders with advice wherever necessary.

(2) By research work, through adequate veterinary organization, making careful and exhaustive studies of these diseases.

(3) By issuing reports, bulletins, or other publications, which may be distributed among veterinarians, dairymen, and breeders, advising them as far as may be practicable what they may do to control the disease.

In the first respect—educating veterinarians—the State of New York has taken a high place in America. The State has founded and equipped a commodious veterinary college, which, however, is not yet complete. Up to the present time, the State of New York has expended about one-third as much on the buildings and equipment of her veterinary school as the little country of Belgium expended upon her veterinary school a few years prior to the world war. When the New York State Veterinary College at Cornell University is compared with other veterinary schools in America, however, there is little complaint to be made. With better facilities, more and better instruction could be given. The agriculturists of New York should have a keen interest in veterinary education and see that their school is brought up to the highest state of efficiency for the needs of the State. There is need for bet-

ter, rather than more veterinarians, in the dairying regions of the State. The college is graduating a sufficient number of veterinarians to furnish an adequate supply in every part of the State. Whatever dearth of veterinarians there may be can be largely corrected in time, if the breeders and dairymen will take a greater interest in veterinary science and let it be known that they need and are ready to support a good veterinarian in their community.

Until recently, American veterinarians have known little of the diseases of cattle. Almost all the veterinary schools of America have been located in great cities and conducted primarily for gain by their private owners. The members of their faculties have not had experience with the diseases of cattle, and there are no clinical facilities for teaching regarding these. Fortunately for the State of New York, when its state veterinary college was founded in 1896 it was located at Ithaca, under the management of Cornell University, in the midst of an extensive dairying district. The clinic in the college at Cornell University has afforded large numbers of cattle for research and observation by the teaching staff, in order that they may be more able to teach students regarding the diseases of dairy animals. Of equal importance, the clinical facilities with dairy cattle furnish necessary material for illustrating to students the nature of these diseases, and methods of handling. The college has—and long has had—the largest cattle clinic on the American continent.

The college has not been unmindful of the interests of dairymen and breeders with reference to research work. Much time has been given to research upon the various diseases of cattle prevalent in the State of New York—especially upon the ruinous group of diseases to which contagious abortion belongs. The study of these diseases was undertaken almost as soon as the college was founded, and the research work has grown constantly, until two years ago a special department was founded for this work, with a professor and an assistant giving their entire time to research upon the diseases of breeding cattle. In this respect, it is unique among the colleges of America.

Two years ago the legislature was asked for a special appropriation of $15,000 for erecting, equipping, and maintaining buildings and for procuring cattle for special researches in connection with contagious abortion. The hearty and vigorous support of numerous cattle breeders in the State enabled the appropriation

bill to be passed. The building has been completed, with accommodations for thirty animals. Before it was fully completed, it was filled with cattle. While there is an opportunity for much interesting work with the room and the number of animals available, the equipment is still inadequate. The amount appropriated for the building, equipment, and cattle—$15,000—represents about one and one half per cent of the estimated annual loss to dairymen and breeders from this one disease in the State of New York.

For several years, the college has issued annually an extensive report, in which the account of the investigations of this disease has occupied a prominent place. The report has been comparatively technical, and only a limited number have been printed by the order of the legislature. These have been distributed as widely as possible to those breeders who were presumably most deeply interested. In addition to these reports, the Department of Research in the Diseases of Breeding Cattle has issued popular bulletins which have been distributed as widely as possible among breeders and dairymen. It is hoped that in the future still more will be done and a larger audience reached.

—Dr. E. A. A. Grange, for many years Principal of the Ontario Veterinary College, has retired from that position and been made Principal Emeritus. He has been one of the leading veterinarians of the country, has held many important positions in veterinary service and is well known to the members of the American Veterinary Medical Association.

Dr. C. D. McGilvray, V.S., M.D.V., of Winnipeg will succeed Dr. Grange as Principal on the first of September. Dr. McGilvray has been for many years the chief veterinary officer in the Province of Manitoba where he has done excellent work in the control of glanders and other contagious diseases. He has published an important paper on the suppression glanders in that Province. He also was the first to bring to the attention of the American Veterinary Medical Association garbage feeding as a source of hog cholera.

—Dr. S. H. Burnett, formerly of the New York State Veterinary College at Ithaca, N. Y., is now located at Laramie, Wyo., in connection with the Agricultural Experiment Station.

MYSTERIOUS LOSSES AMONG CATTLE IN THE PACIFIC NORTHWEST*

A Clinical Study

DR. C. H. SCHULTZ, Seattle, Wash.

During the last three years, losses among livestock in our states have been severe. Every month newspaper notices appear, stating that a great number of animals had perished under mysterious circumstances; investigations have been conducted, to be sure, but the problem has evidently not yet been solved. Several diseases should be considered, some at least, of bacterial origin; isolated instances where poison was used with criminal intention may have caused some losses; plant and forage poisoning have been blamed in several localities, without obtaining definite proof, however. In every number of our veterinary publications articles appear, discussing destructive outbreaks among cattle; without being able to announce a definite diagnosis. Hemorrhagic septicemia is usually mentioned in connection with these outbreaks, but investigators have found it exceedingly difficult to demonstrate and isolate *Bacterium bovisepticus.* Drs. Mack and Record presented a paper at the annual meeting of the A.. V. M. A., in Kansas City, under the title "Studies of an obscure cattle disease in Western Nevada". It brought forth a most interesting discussion; although several veterinarians expressed their views in a liberal manner, a definite diagnosis has not been established.

In Washington, we have similar outbreaks and have had them for years. It is possible that true hemorrhagic septicemia in violent form occurs, but in several instances consideration of history and clinical appearances supported by careful bacterial studies failed to demonstrate the presence of pathogenic bipolar organisms. Dr. A. U. Simpson, M.D., our city bacteriologist, a most conscientious investigator, was not able to demonstrate *Bacterium bovisepticus* in specimen from three different localities, although the lesions and appearance of tissues would be accepted as characteristic of hemorrhagic septicemia.

After many observations and as careful a study as circumstances would permit, I diagnosed what is commonly known as

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"red dysentery" of cattle as the cause of a great part of these losses. The purpose of this article is to call your attention to this disease, to explain some of its peculiarities and destroy as much as possible the shroud of mystery that has always surrounded it, not only during its appearance here, but wherever it has been observed.

The cause of red dysentery in cattle was first recognized and described in connection with the disease by Dr. F. A. Zurn, in Leipzig, Germany, in 1878. The material which he examined was obtained from calves which died from the disease while pasturing on moist land. Since then the malady has been recognized from time to time and descriptions have appeared, especially in European journals. From 1885 to 1891, it destroyed many animals in Switzerland, where it was identified by Dr. Zschokke (veterinary college Zurich) and Drs. Guillebeau and Hess (veterinary college Bern). Their articles were published in 1892 and 1893, and are used as references in our textbooks today. Another article on the same subject from the pen of Dr. Zublein appeared in a Swiss veterinary journal in 1908. In 1905, an outbreak of a mysterious disease destroyed a great number of cattle in Tunis (Africa); at first anthrax, blackleg or piroplasmosis was accepted as the cause, but M. E. Ducloux identified it as red dysentery, a disease which had not been recognized in that part of Northern Africa before. During the last decade its distribution on all continents, with the possible exception of Australia, and on many islands has been reported.

The specific cause of the scourge is a protozoan, a minute organism that belongs to the primitive, unicellular forms of the animal kingdom. The bacteria, on the other hand, belong to the simplest, smallest forms of the vegetable kingdom. The organism under discussion passes through a complicated life-cycle and has a peculiar ability to adapt itself to marked changes of environment. Some of its forms are very resistant and can dry out or freeze for months and begin to multiply when moisture and temperatures become favorable. The organism in question is known as coccidium oviforme or coccidium zurni. It belongs to the

Phylum Protozoa,
Subphylum Plasmodroma
Class Sporozoa (Leukart)
Subclass Telosporidia (Schaudinn)

which is divided into different orders by different authorities:

1. Order, Gregarinidae,
2. Order, Coccididae,
3. Order, Haemosporidiae.

Systematic Zoology shows that coccidia are closely related to the haemosporidia, which multiply in and are especially destructive to the red blood-cells of their host. The malaria parasites belong to the haemosporidia; their life cycle resembles that of the coccidia in many ways, but it is still more complicated, because they require a change of hosts to complete it.

The close relationship of these two groups of destructive parasites has not received due consideration and should be remembered when symptoms of the early stages, with high temperatures are considered.

In Neumann-MacQueen's work on "Parasites and Parasitic Diseases of Domestic Animals", II edition, an interesting list of tissues and organs in which coccidia have been demonstrated by different investigators will be found; it shows that nearly every organ has been invaded by these destructive protozoa. Several authorities (Balbiani, Novy) have also found them in the blood-stream. These facts have often been overlooked, but should be duly considered because they may help to explain the serious and often mysterious disturbances produced by coccidia.

In "A treatise on Zoology", second fascicle, 1903, by E. Ray Lankester, on page 206, the statement is made, that:

> "Coccidia are chiefly parasites of epithelial cells, and since the infection of the host appears to take place in all cases by way of the digestive tract, it is the epithelium of the gut or its appendages, such as the liver, that is most often the seat of the parasite. In a considerable number of cases, however, the parasitic germs, after entering the system by way of the gut, go further afield before settling down. Passing through the gut wall the parasites are transported, probably by the circulation of the blood or lymph, to their specific habitat."

All classes of animals may be attacked by this type of protozoa. They have been found in centipedes, insects, clams, crayfish, fish, frogs; they often cause fatal diseases among rabbits, mice, moles, sheep, goats, cattle, swine, many kinds of wild animals, but especially among the different species of birds, from house-sparrows

to wild swans. Even the human family has been attacked—several cases of coccidian diarrhea in man have been observed and reported. Another peculiarity of coccidia is that they do not always attack the same organs. They are mostly cell-parasites, that means that they bore into a cell of the lining of the intestines, for example, and enlarge and multiply in it. This destroys the cell, the young attack new cells and in course of a few hours serious injury to the attacked tissue results. Some of these protozoa multiply in the intestines; this occurs commonly in cattle, sheep and chickens; other kinds prefer the kidneys, as in mice and frogs; in rabbits they invade the intestines, the liver and gall ducts, the lungs, nose and eyes; in swine often the lungs; in birds usually the intestines, but they may be found in the chest, on the lungs, on the ribs, on the liver, in the kidneys, the nose and even the eyes. Young animals of all species are most frequently attacked. Protozoa as a class are far more destructive to the young than to older hosts; if an animal passes through an attack of a disease, it acquires a certain degree of resistancy against a subsequent attack. This may, to some extent, explain why not so many older, full grown animals are afflicted. Another peculiarity may here be mentioned in connection with protozoan diseases; it is that the processes which produce so-called "immunity", or to be correct, "resistancy", are very complicated and not well understood. An animal may have a certain amount of resistancy when in good health, but if weakened by overwork, hunger, or another disease, this resistancy is lessened or may be entirely destroyed. This explains why animals are "more or less resistant". When an animal takes up from some source or other a certain amount of virulent material, it becomes sick if the organisms are able to multiply rapidly; but if they cannot multiply, it remains apparently healthy. This happens when the resistant power is high, and the parasite can multiply only slowly or not at all. Such an animal becomes therefore a "carrier" of that disease; itself resistant, immune, it carries the cause of disease and disseminates it, maybe not always, but periodically, at least.

This is one of the peculiarities of protozoan diseases. If all the animals that come in contact with a carrier are resistant, no outbreak occurs. But if such a carrier goes into a neighborhood where susceptible animals are, the disease reappears (no one can tell from where) and, conditions being favorable, a sudden outbreak occurs, assigned to a mysterious cause.

It is also necessary to consider, that coccidia pass through a very complicated life-cycle. This phase has received especial attention from the German scientist, Dr. Fritz Schaudinn, whose classical studies of malaria are world-famous. He worked out the life-cycle of coccidia in the centipede and mole; since then investigators have studied it on rabbits, chickens and other small animals.

In the Twenty-seventh Annual Report of the Bureau of Animal Industry, 1910, U. S. Department of Agriculture, a short sketch of diseases caused by protozoan parasites appears. Several pages are devoted to the subject of coccidia; their complicated life-cycle is explained by a full page illustration and comprehensive text.

About 1905, a fatal disease that destroyed the grouse on the moors in Scotland became so virulent that nearly all the young birds died. A special commission was appointed to investigate it. The results of this investigation were published in the "Proceedings of the Zoological Society of London" during 1909 and 1910. In a most interesting series of articles, Dr. H. B. Fantham states that the cause of the plague was a coccidium; and gives an exceedingly useful and interesting account of the mode of multiplication of the parasite, which resembles that causing the disease in cattle.

Dr. E. Montgomery, pathologist in Nairobi, British East Africa, identified and described the disease in young cattle during 1911 and 1912. Another interesting article from the pen of Dr. Walter Jowett, pathologist of the Department of Agriculture of Cape Colony, in Capetown, South Africa, was published in 1911.

Red dysentery in cattle is caused by coccidium oviforme (egg-shaped coccidium). Under the microscope it appears as an oval, body about 30 microns long, half as thick, with a well defined double outline; its protoplasma may appear quite clear, with a large nucleus. Young forms show faint outline; they are protected by surrounding cells and under favorable conditions multiply rapidly by simple division.

Sometimes one protozoa divides into a great number of daughter-cells and the process is repeated for many generations. It is this primitive but rapid division that destroys the host. Whenever these rapid division forms are found in great numbers, the disease exists in a dangerous form. After a certain time this quick asexual method of multiplication stops. The minute protozoa become differentiated into male and female forms; fertilization then

takes place and better developed but still unicellular organisms with a well marked double outline, a resistant tough capsule, are formed. Into the larger of these the male forms penetrate at a certain point and soon there appear in the roundish or egg-shaped, transparent parasite four small oblong bodies, spores. These are also surrounded by firm membranes; each one divides again into two small organisms, so that a fertilized female cell eventually produces eight minute offsprings, sporozoites. These forms are all very resistant; they can stand drying out, freezing, and may lay dormant for a long time. Whenever conditions are favorable for further development, they emerge from their protective capsules. These resistant forms may be lodged on grass, or in the dried condition on hay, oats, corn; or they may be found in contaminated waterholes. As soon as they are taken into the intestinal tract of suitable animals, their capsules are dissolved and the motile minute parasites bore into suitable cells and begin the rapid, simple process of agamic multiplication.

These different phases of development provide material for most interesting studies and are even today not definitely known. They are very important, because if they were fully understood it would help us to devise protective measures. We know, for example, that these protozoa can only attain full development in the presence of oxygen; certain temperatures are more favorable than others. Moisture is necessary. Other important points, on the other hand, are still in dispute. Many observers say that they are obligatory parasites, others say that they are only facultative parasites. This point is very important, because an obligatory parasite can only develop within its host, but a facultative parasite is able to live or even develop and multiply outside of the host.

Here, then, is an important question that needs most careful investigation, and, since these organisms are so primitive and therefore often very difficult to recognize it will require careful observations.

Dr. Eckhardt, in an article on intestinal coccidiosis in poultry, published on pages 177-180 of No. 11, March 12th, 1903, of the *Berliner Tierarzliche Wochenschrift,* makes the statement that "coccidia are only facultative parasites which multiply rapidly in moist garden soil on hot sultry summer days especially in decaying or putrid substances. When taken up by animals in water or food the disease appears. Some birds die suddenly without visible symptoms."

Guillebeau in 1892, reported that coccidia were able to divide and multiply in different manner when subject to different temperatures—this is important when we consider that animals become infected because they eat contaminated hay—dried during hot summer weather on irrigated fields, where the temperature would correspond to 104°-110° F., as against temperatures of 70°-75° F., or lower, which are often found on moist pasture lands in the western part of our state.

The disease is commonly caused by the ingestion of coccidia on grass, hay or water. The early symptoms may vary, depending upon susceptibility of the animal and amount of virulent material taken up. Some cases terminate fatally in two or three days. The owner observes that animals are humped up, look distressed, and finds them dead on the next day—often with good pasture all around them. Other animals in the same pasture are not affected; several may appear sick later on; when examined they show more or less discharge, water or slimy, at times streaked with blood, from the nose; they may show slight inflammation of the eyes. Some animals eat, others do not. Usually cattle appear dull, seem subject to chill, stand humped up, coat is staring, rumination is suspended, they grind their teeth; drooling is quite noticeable, defecation is usually very scanty. The abdomen is markedly tucked up and they drink a great deal of water if not too far away. Evidently moving about causes pain and they will lay down or stand quietly if not disturbed. During these early stages a raise of temperature to 104° or even 107° F. will be registered on the thermometer. Constipation is the ever-present important symptom. The attack may cause death in a few days, even before diarrhea sets in. In other cases the period of constipation, during which feces, formed into hard pellets or disclike masses, covered with mucous, sometimes streaked with blood, are passed—is followed by well marked diarrhea. The feces become watery and show remnants of imperfectly digested food. The discharge soon becomes offensive, because the bile is not secreted properly and its antiseptic property is lacking. The secretory glands of large parts of the intestines are involved, croupous casts are passed out in large masses; often they show bloody streaks. If discharge from nose becomes creamlike and yellowish, the upper air passages and even the lungs may be involved. In severe cases, all these processes are rapidly progressive; emaciation, weakness and general debility, due to the

destructive processes in the intestines and the inability to absorb nourishment causes death in a few days.

On the other hand, some animals will pass through a mild attack without marked symptoms. They may stand about humped up; milk cows give less milk; are drowsy, show constipation and scant, hard, rather dry feces, invariably covered with a thick layer of mucus, at times streaked with blood. After a period of constipation extending over several days, diarrhea sets in. The last part that passes out is quite thin and contains a mass of pale yellow or clear mucous. It may have an offensive odor and show bloody streaks. This stage may only last during an evening and the animal appear all right the next day. Similar periods re-occur from time to time.

These are chronic cases of coccidiosis; in other words, a mild form of red dysentery of cattle. The animal that is afflicted is resistant—because it has become accustomed to the parasite. Therefore the coccidia for reasons which are not well understood, multiply only in a more or less limited part of the intestines (usually the last part of the colon and the rectum), cause a chronic moderate inflammation and small defects in the lining of the gut, but nothing more serious. This process may involve only part of the rectum, or it may affect the gut from the cecum (blind gut) to the anus; it may also be more or less severe. In dairy cows that were slaughtered for other causes, the parasites could often be observed on the folds of the fourth stomach, which appears to present conditions especially favorable for the development of coccidia.

In very mild attacks, practically no disturbance will be observed. In the more severe cases of this chronic form, the constant drain on the host is severe. Animals produce less milk, drop calves too soon, show a ravenous appetite and instead of being well nourished and good producers lose flesh, so that they must be discarded. The mucous that such animals pass in their feces is produced by the intestinal cells as a result of constant irritation; it requires nitrogenous material, albumen, for its production and costs a good deal to produce. I wonder if the remarkably low per cent of milk solids which have been reported in some of our dairy herds must not be charged up to this cause. Observations, which extend over several years, from April, 1915, until now, convince me that this disease in its chronic form is very common among our dairy cattle. It can be observed in all the dairies that feed alfalfa hay obtained

from irrigated districts in Eastern Washington. Evidently the alfalfa fields in irrigated districts are infested and supply contaminated hay.

The beginning and course of the chronic form is usually so insidious that it has been overlooked. Stock owners call their veterinarian only when animals are in great distress. This type of disease requires careful consideration of history, clinical symptoms and microscopic examination of feces, not only once, but during different periods, because as already stated, the parasite goes through a well defined cycle of development and cannot always be recognized.

An important factor in the dissemination of coccidia is the number of chronic carriers, animals that have the disease in a mild form.

The fertile, encapsulated forms that alone can infect pastures or cause the disease in susceptible animals are not formed in animals that perish, but in those that recover. These resistant forms are passed out in feces and usually develop on the pastures if temperature and other conditions are favorable. After they have reached full development, they are very resistant and may remain dormant for a long time, certainly for several months. Their existence outside the body is still an obscure chapter. In Switzerland, several cases of red dysentery have been observed, the disease being caused by feeding contaminated hay in winter. In other cases it appeared among young stock in summer on pastures which were frozen and covered with snow during several months.

It goes without saying, that the disease can and is further distributed by animals that are shipped from one part of the country to another. Especially would this be important if it is demonstrated beyond a doubt that coccidia are only facultative parasites; that is, that they can multiply and exist in waterholes or on carcasses of dead animals or on miscellaneous matter, such as decaying fruit or roots, manure or slime in ditches. A carrier would drop them on a pasture, the weather being favorable (hot) and the ground moist, the protozoa would multiply and dry up. Some weeks afterward young stock is driven into the same field and after a few days animals begin to die, others have diarrhea and become thin and weak. Not very mysterious, after all!

A severe outbreak among young cattle running on the range, near Alder, Pierce County, Washington, a town on the Tacoma and

Eastern Railroad, and one in a large dairy herd near Seattle, were traceable to such causes.

In regard to the cause of death, we again find it difficult to arrive at definite conclusions. In some cases where animals have been afflicted for several days with fever and constipation, followed by diarrhea and gradual loss of flesh and increasing weakness, the lesions in the intestines were insignificant, certainly not severe enough to cause death. We ascribe death in such cases to the absorption of poisonous substances and the inability of the body to get rid of them. In severely acute cases, the escape of blood through the intestinal mucosa and intense diarrhea cause death. In peracute cases, die suddenly or in severe cases lasting but a few days, showing great distress, dyspnea and high temperatures, the blood will be found to be very dark, coagulating poorly or not at all, evidently unable to carry oxygen; hemolysis may be more or less pronounced, all characteristic of a septicemia.

Whenever the disease has appeared in chronic form, many unthrifty, poorly developed, cachectic animals will be observed. Young animals fail to grow, show great weakness and emaciation, although they eat, chew their cud, and appear hungry. These often develop progressive anemia and pronounced cachexia. On post mortem, but slight lesions can be found. The condition is due to inability to digest and faulty absorption. Others are chronic cases; they improve but have frequent recurrent attacks of severe diarrhea; systematic examinations will demonstrate that they distribute periodically great numbers of zygotes; hence they are carriers of the protozoa—never very sick, resistant against the mild infection, they scatter the protozoa wherever they go.

The difficult part, therefore, is to recognize the trouble early. We cannot eradicate it, but we should be able to guard against the sudden destructive outbreaks, where the mortality has at times reached 60%. The severe outbreaks among young stock, where animals die very suddenly, must be controlled by preventive measures, sanitation, and as far as possible by protective serum or vaccines. These can only be developed along rational, satisfactory lines if we understand the ways and means of attack of the hidden, mysterious enemy. The losses caused by red dysentery among all classes of domestic animals have often been very serious. In some parts of Africa (Tunis and Cape Colony), in Asia and many European countries, thousands of cattle have perished. The economic losses

in the western part of our state are considerable, among pure bred as well as grades. Three years ago, after the identity of the disease was established, I began to make trips to localities where animals died from mysterious causes. Wherever cattle died suddenly, the owners were convinced that their stock had been poisoned.

Mr. Albert Jacobson, our city chemist, has carefully analyzed stomach contents from many such cases, without being able to demonstrate poisons. Professor Johnson of the University of Washington has had similar experiences. Examinations of tissues and blood for bacteria, especially *Bacterium bovisepticus,* anthrax symptomatic anthrax, malignant oedema, and other pathogenic organisms, have been carefully carried out in the laboratories of the Public Health Service, the State Board of Health and the Department of Health and Sanitation. Dr. A. U. Simpson, M.D., our city bacteriologist, an exceedingly conscientious investigator, took great interest in these problems—but has seldom been able to demonstrate pathogenic bacteria.

A few miles south of Seattle, near Allentown, is a large wet pasture. It is not fenced and cattle of all kinds use it for a common feeding ground. Several open ditches meander through it and furnish contaminated surface water. The land is usually covered with water during the rainy season and is therefore washed off. As soon as the weather is warm, mild cases of red dysentery can be observed. In calves, attacks often assume a severe and fatal form; owners claim that the animals are poisoned, because they do well as long as they are fed in their yards. It is my supply field for infested material which can be found in one form or another throughout the year.

On September 22, 1915, Mr. A. W., who owns a small dairy on the hill near Bryn Mawr, three miles from Renton, brought to Mr. Jacobson's laboratory the omasum and abomasum of two young cows that died in the morning without having shown symptoms of disease. He requested careful chemical analysis of stomach contents for a series of poisons. The mucosa of the fourth stomach of one animal was rather pale, no evidence of corrosive poisons could be detected; a great number of minute, pearly gray, translucent nodules, arranged in groups, were readily seen upon careful examination. They protruded slightly above the mucosa and appeared to extend to the fundus of the crypts; they corresponded nicely to the description of coccidia as found in Hutyra and Marek.

The other stomach showed but few of these, but many very small, deep ulcers, where blood escaped, were found. Evidently the fine pellicle which covered them had broken open and the parasites escaped, leaving a minute but deep defect reaching at least to the basement membrane of the crypts.

Careful analysis for several poisons which might have been used gave negative results. An investigation of the premises showed that six other cows were afflicted with offensive slimy diarrhea. The owner stated that a nice Guernsey grade which appeared languid and thin, had not been doing well all summer. The calves were kept in a small pen, they were unthrifty, languid, sunken eyed; had diarrhea, two showing slight whitish secretion in the lid sacks and marked slimy discharge from the nose. The microscope demonstrated masses of schizonts in the mucous from cows and calves.

Mr. W. F. B., near Clifton, Washington, whose ranch is located at the head of Hood's Canal, lost several valuable Guernsey grade heifers during the year 1915. The losses were attributed to poison—six animals were found to have died suddenly at one time in one pasture. Stomach contents were analyzed by Professor Johnson in the laboratories of the University of Washington in Seattle, with negative results. The case was tried in the courts in Shelton, and is therefore of record; accused party was discharged. Several trips were made to this ranch and owner stated that cattle began to die the year after alfalfa hay from the irrigated districts in Eastern Washington had been fed, during the winter months. On July 9th, 1916, several animals on the place were afflicted with quite severe chronic diarrhea; one heifer showed marked slimy discharge from the nose and was certainly not doing well. Microscope showed schizonts and epithelial cells in great numbers in slimy mucous.

On December 9th, 1916, a nice heifer was found dead, apparently from the same cause which killed the animals on other occasions. Careful post mortem examination and study of collected specimens left no doubt—an acute attack of red dysentery.

On ranches located nearby, calves and colts begin to suffer from severe diarrhea and dysentery late in the summer when pastured in low bottoms, but usually recover when driven into the hills. Several die every year; others are stunted because they are

chronic cases. On this place rational prophylactic measures have stopped the losses, no further outbreaks have been reported.

An interesting outbreak occurred on upland pastures a few miles southwest of Redmond, Washington, during May, 1917. Mr. C. drove 23 large healthy grade Holstein heifers from Kent to his pasture about the middle of May. The animals were turned loose in the south forty acres, where a small stream and springs provided good drinking water; a clearing, an old orchard and some old buildings surrounded by alder and small timber made it an ideal place; grass was abundant, so that the animals prospered. When pasture became short, the herd was driven across the road into the north forty acres. The land had been cleared with stump pullers, the logs burnt and the ground seeded to clover. The soil was clay, impervious to water. A small stream in one corner supplied running water. The weather was dry and quite hot, the whole herd had to go to the creek to drink, no other supply being available. The heifers were doing well. A week later rains set in; the large stump holes acted as catch-basins for surface water. After a few rainy days, the weather became hot and sultry; the animals remained on the hill and drank water from the stump holes. In a very few days the caretaker reported to Dr. J. P. Johnson, at the time veterinarian in general practice in Redmond, that some of the heifers were very sick, acted as if they had pneumonia and suffered from severe offensive diarrhea. Several appeared drowsy, thermometers registered temperatures of 105° to 107.4°; respiration was labored and rapid; marked discharge from nose was slightly streaked with blood; some were frothing at the mouth and grinding their teeth; abdomen was drawn up and they appeared to be in great pain and distress. Pulse weak and rapid, often almost imperceptible. Scanty defecation was followed by severe, offensive diarrhea. Most animals were sick 6 to 8 days; 13 died out of the 23. Post mortem examinations were made by several veterinarians, wihout definite results, however.

Dr. Johnson found all the organs in a state of severe congestion. In the abdominal cavity, the serous layers were dry and rough; peritoneum was severely inflamed; the liver was brownish, very friable; stomach empty; in several places the intestinal mucosa was separated from its basement membrane, permitting the dark, tarry blood to escape into the lumen of the bowel. The rectum and part of the colon were filled with a mass of dark, poorly

clotted blood. Tinged slimy mucous escaped from the nose. In some cases dark blood escaped into the subcutaneous tissues and caused deeply tinged blotches. The bladder was filled with darkly tinged urine. Most remarkable conditions, when we consider that the animal was destroyed and the post mortem held at once. Blood when kept in a bottle remained dark, it did not coagulate. Liver and spleen were sent to laboratories in Seattle. No cultures of pathogenic bacteria could be demonstrated. Cultures resembling *Bacterium anthracis* were obtained from one specimen, they proved to be non-pathogenic to laboratory animals. In this connection it is well to remember that Dr. V. A. Moore described in his Microbiology twenty organisms which resemble *Bact. anthracis.*

After remaining several days on the infected pastures, the herd was driven into another corral where good water was available, several afflicted heifers improved rapidly and made good recoveries. Some of the animals that ate eagerly of baled alfalfa hay about 8 o'clock one evening were found dead next morning. If the history had been unknown, such cases would surely have been designated as poisoning, especially in range countries. After the herd was removed to the corral, animals which showed no symptoms registered temperatures around 105°, proving that high temperatures are to be expected in the early stages. Treatment consisted in stimulants and as good care as circumstances would permit.

On June 16th, I made a trip to the infected pasture and water-holes. From slime and sediment oocytes showing spore formation were obtained by washing and sedimentation methods. The remaining ten heifers were again running in the north pasture; doing well. Two weak animals were still afflicted with slimy diarrhea. In mucous which they passed, a great number of epithelial cells, a number of schizonts and well developed macrogametes could readily be demonstrated. In this instance it has been demonstrated beyond a doubt, that the outbreak was due to a common source of infection, the infected water-holes, that the disease was not only occasionally directly transmittable, and that a period of dry hot weather, followed by warm rains and hot sultry summer days permitted rapid multiplication of the destructive organisms. It was unfortunate that it was not possible to leave the pasture with the infected water-holes and turn a number of susceptible Whidby Island yearlings loose in the same field, so as to observe the earliest symp-

toms and undertake a comprehensive study of the protozoan and its development in the drinking water or on the grass. The dangerous but interesting conditions can be reproduced artificially in hothouses or on favorably located fields in summer time. It would be quite worth while and I hope to find such an opportunity sooner or later.

When in July, 1917, a notice in our daily papers stated that range animals valued at $150,000 had perished in a few days near Klamath Falls, Oregon, I decided to make a trip to that locality. Arriving in the Oregon city on August 2nd, it was found impracticable to go to Malin, where the losses were so numerous and sudden, the animals having been removed to other pastures. I am greatly indebted to Mr. J. F. Kimball of the Weyerhauser Timber Company, and Dr. G. C. Mitchell for rapid transportation and a great deal of really useful information. Although several diseased animals were located, observed and studied, nothing even approaching poisoning could be identified. On the other hand, cattle observed on dairy farms, as well as on the range, showed infection identical in every way to the cases found near Seattle. Evidently losses in the State of Oregon are due to the same cause as those in Washington. We can readily see what occurs around watering places where cattle congregate as soon as the dry season has set in. The holes become contaminated from droppings, which remain moist and warm so that protozoan or bacteria can develop and multiply. Drying out for weeks has no deleterious effect on encysted coccidia, it represents simply a suitable resting period. This phase of the coccidian life cycle has not yet been investigated as it should be, and presents a most interesting subject for systematic investigation.

When warm showers dissolve the miscellaneous matter in which the parasites are, they begin to float around the waterholes. Whenever susceptible animals take them up on feed or in the drinking water, outbreaks occur. This assertion is borne out by numerous observations—contaminated material, a period of dry hot weather, warm rains to liberate the contagion and then susceptible animals make an ideal combination for an outbreak. This was well illustrated in the outbreak near Redmond and on LaConner Flats.

Cattle run on alfalfa pastures which become contaminated from the manure; when moisture and warmth are supplied the or-

ganisms multiply and are carried on to the stems of the plants where they encapsulate and dry out during hot summer weather or when the hay is cured. Fed to our dairy cattle in Seattle, it has not infrequently caused severe outbreaks of diarrhea, affecting a great number of animals in some herds. Three such instances are described in my notebook.

Dairymen in Seattle know that cattle bought on Whidby Island—mostly Guernsey grades—often become sick when first fed alfalfa hay. One well known firm lost eight animals from this cause during the late summer and fall of 1916.

Having obtained assignment to slaughterhouse inspection last summer, cattle from many parts of the country could be observed soon after arrival. Stomachs and intestines could be examined and studied soon after slaughter in a systematic manner. During the dry hot season, it was not unusual to find steers afflicted with intermittent diarrhea. Cattle from Toppenish Flats, Washington, steers from Myrtle Point, Oregon, others from the vicinity of Roseburg, were all quite heavily infected. About three weeks after the heavy rains flushed out the water-holes and stagnant creeks, these chronic carriers cleared up. No doubt can therefore exist as to the dissemination of this group of parasites and the enormous losses which red dysentery causes to our livestock industry. Investigations along this line have not received the attention which they deserve and special efforts should be made definitely to establish the identity of the causes of the many mysterious outbreaks which have ravaged the stock raising districts in Oklahoma, Texas (Ward County), California, Oregon, Montana, Idaho and Washington.

In July, 1916, Dr. C. E. Richards, M.D., from Des Moines, Wash., brought specimen of tissues to the city laboratories and stated that cattle near Des Moines died from acute attack of coccidiosis. The doctor had studied the disease in Iowa and was probably one of the first to recognize and diagnose it in cattle in our state. Losses around that settlement were quite severe during the summer of 1916.

Dr. Julian Howard, veterinarian, located in Stanwood, Washington, has also recognized the disease and found the coccidia in feces of afflicted cattle and sheep.

In the fall of 1915, Dr. H. Welch, veterinarian at the experiment station in Bozeman, Montana, reported that he had identified acute coccidiosis and demonstrated the parasites in the intestines of pure bred Holstein calves which died from rather obscure causes.

While the technique of examinations for coccidia is not difficult, it is not given in our text books. No satisfactory method of making permanent mounts for future reference and comparative studies is taught in our laboratory courses, and even text books on microscopic methods do not give us much help. We are taught that it is necessary to section tissues to demonstrate the parasites. When I made the statement in Oakland, California, before the A. V. M. Association, that examination of feces gave us a safe and quick method to diagnose this disease in its early stages, I was challenged at once and severely criticized. In Dr. Law's text book of veterinary medicine, II edition, 1905, Vol. 2, page 265, we find the terse statement that "Diagnosis can always be made by microscopic examination of fresh warm feces"!

In "Bacteriankunde und pathologische Mikroskopic" by Dr. Med th. Kitt, IV edition, 1903, the suggestion is given, to examine feces, fragments of mucosa, mucous or croupous membranes because coccidia in great numbers would be found. The author states that 50 to 100 parasites may be found in one field under the microscope.

Illustrations in the numerous short articles published and accessible cannot be considered satisfactory. They leave the impression that coccidium oviforme is an obligatory cell parasite and lay great stress on the presence of the encapsulated forms of the zygote and spore-formation. These forms occur only in animals where the rapidly destructive asexual division (schizogony) of the parasites has reached its limit. In all severe cases, especially in those that end fatally in a few days, the schizont alone may be found in immense numbers—in masses, and this rapidly multiplying asexual (agamic) division form should be studied, so that it can be recognized. The position of the parasite in the cell is frequently very useful to identify it. This is what pathologists look for. Since it would be very useful to be able to stain and mount in a simple but permanent manner mucous containing these parasites, a practical method which has been found to be acceptable and which has given satisfactory results will be described in detail.

Dr. Ph. B. Hadley of the Rhode Island Experiment Station has devoted a great deal of time to the study of this group of diseases, especially among fowls and birds. He found it difficult to distinguish and identify coccidia among intestinal contents but overcame the difficulty by bringing out a differential staining method.

The article, "Regarding the value of the Van Giesen and Romanowsky malarial stains for the detection of coccidia" is found on page 147, No. 1, Vol. 52, originale Abth. I, *Centralblatt fur Bacterien kunde*. The article is written in English and contains very useful information. My efforts along this line did not produce satisfactory results and it was only when Rosanilin violet, which Dr. Hadley kindly sent me, was used that marked differentiation was obtained. These stains are not permanent, however.

The greatest stumbling block apparently has been the attempts to subject such material to bacteriological methods, especially that of dehydration with heat or alcohol.

The parasites are of appreciable dimensions, although schizonts in early stages of rapid development may only be 3 μ and appear round or oval, somewhat resembling small lymphocytes or basophile leucocytes. Unstained or when flooded with weak Loeffer's meth. blue sol., they show a delicate fine outline and a denser faintly variegated nucleus. Schizonts stain with difficulty and always unevenly. Merozoites are mobile, and can be distinguished by the peculiar grouping and method of division as seen in the fully developed trophozoite. Epithelial cells of certain types may be mistaken for merozoites. All these forms are soft, jelly-like masses and may become markedly distorted by the manipulations on the slide or undue pressure of the coverglass.

In "Principles of Microbiology", by Dr. V. A. Moore, Ithaca, N. Y., 1912 Edition, chapter on protozoa, page 429, the author states that:

"The coccidia in the liver show themselves in two principal forms. The free coccidia, schizonts, merozoites or young macrogametes are most frequently spherical or elongated, 12 to 14 microns broad and 17 to 22 microns long. Some are almost homogeneous and very refrangent, with darker central point; they resemble cells undergoing fatty degeneration. Their volume varies from 6 to 8 to 30 microns. They are often included in epithelial cells and solitary or grouped in small masses in the same cell. The encysted coccidia (oocyst) may also exist in the interior of a cell and like the preceding, they are sometimes lodged in large giant cells.

It is not rare to find white particles floating in the bile, similar to the contents of tumors and almost exclusively formed of coccidia.

Rivolta once found numerous encysted coccidia in the epithelium of a dilated gall bladder."

Many hundreds of examinations have been made and prove that as a result of the irritation caused by these parasites an unusual amount of mucous is secreted by the goblet cells. During the early diarrheatic period, mucous is produced copiously, forming casts or false membranes; later on, in flake or shreds, finally, when the intestinal mucosa has been severely attacked and became exhausted, in minute particles only.

Coccidia are usually found in these mucous masses and flakes. They may be present in immense numbers without cells or tissue fragments. Feces containing mucous are washed in large amounts of cold water until the water runs off clear. Large particles can then be fished out, small ones aspirated with suitable pipette: large amounts are best washed over fine sieves or on a double layer of gauze. In case of very offensive diarrhea, decomposition must be arrested by adding to the collected material as soon as possible an equal amount of Kaiserling No. 1 solution; slimy discharges are easier to manipulate when this is done.

The rinsed mucous and tissue shreds when collected are kept in equal parts of water and Kaiserling solution No. 1, which leaves the mucous nicely transparent, inhibits growth of all but few miscellaneous bacteria and fungi and is easily obtained. Certain resistant fungi, however, have produced marked mycelia and even gonidia in specimen bottles containing 50% Kaiserling solution No. 1. Tissues fragments and especially epithelial cells show good fixation, so that cell inclusions and nuclei remain well preserved. If Kaiserling's solution No. 1 cannot be obtained, preserve washed specimens in 10 to 20% formalin solution; specimen kept preserved for years stain well.

When ready to examine for parasites, fish out a reasonable amount and wash carefully in several changes of water to remove preservatives. Place selected particles on a slide, cover with cover glass and examine while wet under the microscope with low power lens. Once familiar with the parasites, they will be recognized without difficulty. A drop of Loefflers' blue (dilute) should be added and produces a transparent specimen. It may be necessary to tease the mucous particles apart to form a thin layer.

For permanent slides, the best results are obtained when the water in the mucous and tissue fragments is gradually replaced by

glycerine. This process toughens the mucous flakes, does not injure cells or parasites and makes the specimen beautifully transparent.

Mucous does not always give the same reaction. A large mass, the size of an egg, produced in a competent, well nourished intestine, free from blood, is quite different from the minute particles found in diarrheatic evacuations of an animal which will die in twelve hours. The latter is rather difficult to wash, stain and examine. Stains must therefore often be selected by trial. Usually it is best to fix material, rinse well and then stain it. Sometimes it was found of advantage to stain before fixing because penetration was better.

Large and firm mucous masses, such as cylindrical casts or ribbon-like false membranes for example, must be cut up into thin pieces to permit the stains to penetrate.

When characteristic forms have been found in mucous that is reasonably free from miscellaneous detritus, so as to be suitable for permanent slides, the mucous is carefully carried through suitable staining processes, rinsed in water and dehydrated and clarified by being gradually carried through 30% to 60%, and then into pure glycerine. The last steps must be carried out slowly, requiring two or three days to obtain the best results. Only stains which contain but little alcohol and which are not soluble in glycerine will be found satisfactory.

Mayer's hemalum or Mayer's acid hemalum, which will show a reddish tinge, produced very satisfactory results. Length of time and degree of dilution required to obtain good nuclear differentiation varies and must be ascertained when staining. It is best to use the stain diluted 1 to 3 of water and stain 24 to 36 hours. Rinse thoroughly and wash in tap water for twelve hours.

Old Delafields hematoxylin penetrates well, but does not give so neat a nuclear differentiation.

Alum-Carmine is one of the best stains, usually it gives well marked differentiations of nuclear structures and clarifies nicely in glycerin.

As counterstain, Bismark brown (vesuvin) has proven to be acceptable, especially when followed by picric acid solution, which acts as a mordant and intensifies it.

1 gram Bismark brown dissolved in 300 ccm. of 3% carbolic acid solution by heat, then filtered makes a serviceable, penetrating

stain which brings out bacteria as well as miscellaneous vegetable structures. Dilute as required and stain 12 to 36 hours. To demonstrate bacteria the stronger solutions are best; for cells and other material, weaker solutions are to be preferred. Trials are necessary. Rinse stained mass lightly and place into aqueous solution of Picric acid, 1 gram in 300 ccm. of water. This bath will intensify the stain and give better definition. After mucous has been stained and rinsed, it is finally mounted in glycerin as stated above. Changes should not be made too rapidly to avoid shrinking and distortion of the protozoa.

It is of advantage to carry material stained in Bismark brown solution through glycerin slightly acidulated with Picric acid.

Eosin soluble in water will also give satisfactory contrasts for hematoxylin stains.

A good quality of cement should be used to paint over the edges of the coverglasses. Oxide of zinc well rubbed up in good fishrod (marine) varnish, which is easily obtained, makes tough dense rings, insoluble in alcohol, but soluble in xylol.

A collection of slides prepared in this manner will keep well and permit a demonstration of these dangerous parasites at any time. The zygotes and fully developed cysts are protected by dense capsule—which forms soon after fertilization of the macrogamete—are easily recognized when found, but they occur usually (there are exceptions) only in animals that recover. Whenever the microscope demonstrates the presence of macrogametes and zygotes, forms which are constant in their appearance and can therefore be identified beyond all doubt, and schizonts become less numerous, a favorable prognosis can be given, because the dangerous agamonous multiplication of the parasites, which is so injurious to the host has reached its limits. The improvement of the animals at this stage of the disease in twenty-four hours is most remarkable and unless toxemia is very severe or injury to the intestinal mucosa has caused serious defects, recovery will be quite rapid. In severe lengthy cases the search for agamonous division forms of the coccidia is tedious and difficult, because the parasites are small, multiplying rapidly, are poorly developed, probably only immature trophozoites or schizonts being present, which are very difficult to stain and identify. In such cases several animals should be examined and better developed forms will surely be found.

Diseases of this class require careful observations and consid-

eration of the clinical symptoms during their entire course, as well as numerous microscopic examinations of blood, excreta, nasal discharges, discharge from sores, urine, etc., before a definite diagnosis can be established. It is also necessary that clinical findings shall be compared—checked up—with examinations of organs and tissues from animals that died. Specimens must be secured during the early as well as during the late stages of the disease, so as to permit a comparative study of the injuries to the tissues and enable us to find the point of attack, study the progress and demonstrate the cause of death. Our present knowledge of the distribution and importance of this parasitic disease of cattle and other animals is entirely inadequate.

A careful, systematic survey of the entire situation should be made, so as to identify and study the different diseases which cause these severe losses among cattle. When the identity of a disease has been established, an outline for a campaign against it can be laid down and measures to prevent its spread can be adopted. Sometimes successful treatment can be inaugurated. The success of such an investigation often depends upon the cooperation and support which the stock owners extend to those that are entrusted with the study and solution of the problem.

(The different stages of development of coccidium oviforme were demonstrated on a series of slides prepared from material collected during the outbreaks near Redmond, Washington, from dairy cattle near Seattle and from Big Soda Springs on Keane Creek, near Pinehurst, Oregon.

Zygotes and oocysts showing spore formation, macrogametes in different stages of development on some slides, while the schizogonous cycle: rapidly dividing schizonts, trophozoites and merozoites were to be seen on others.)

—Dr. L. A. Maze, formerly with Parke, Davis & Co. at Rochester, Mich., has purchased the practice formerly conducted by Dr. O. E. Parker at Pontiac, Mich. Dr. Parker is now at Fort Oglethorpe, Ga.

—Dr. A. W. Swedberg of the B. A. I., who has been at Omaha, Neb., since January, 1917, on Tuberculin Testing, has been transferred to Denver, Colo.

A PHYSALOPTERA FROM THE DOG, WITH A NOTE ON THE NEMATODE PARASITES OF THE DOG IN NORTH AMERICA

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Reseach Laboratory, Parke, Davis & Company, Detroit, Mich.

In a series of over 300 dogs examined post mortem at Detroit, we found a single female specimen of *Physaloptera* in one dog, No. 300, an incidence of about 0.3 per cent. The head of the worm was so deeply and firmly imbedded in the duodenum about an inch below the pylorus, that we were unable to remove the parasite by what we regarded as a reasonable amount of traction without danger of breaking it. The worm and the tissue to which it was attached were, therefore, placed in normal saline solution for a time, and in the course of an hour the worm relinquished its hold and separated from the intestinal wall.

The description of a new species of nematode on a single female specimen is not a wholly satisfactory proceeding from the standpoint of those who describe such species or those who must consider their descriptions later. On the other hand, if it is desirable to describe the rare parasites of dogs, which parasites have considerable bearing on the subject of the dog as a carrier of parasites usually occurring in other hosts, then it is desirable that we have some name by which these parasites may be discussed. It simplifies discussion, and it is no serious matter that a parasite may be found to bear more than one name and that all but one of its names must be rated as synonyms.

On these grounds we are describing the nematode found by us in the dog as a new species. It is entirely improbable that this is a customary or even common parasite of the dog. It is probable, though not certain, that it is a parasite of some wild mammal, but it might even be a parasite of a bird or reptile, temporarily present in the dog after the dog had eaten the infested animal. In any case it is quite apt to be a species heretofore undescribed, as there has been but little study of the genus *Physaloptera* on this continent.

Species *Physaloptera rara* Hall and Wigdor, 1918.

SPECIFIC DIAGNOSIS.—*Physaloptera*: Anterior extremity of the body somewhat attenuated. Cuticle strongly annulated (in the

female at intervals of 50 to 200 μ), the first annulation behind the head forming a sort of collar, with the head somewhat sunk in the depression formed by this collar. Mouth with 2 large lateral lips (Figs. 1 and 2), each of which is prolonged anteriorly by 3 prominent teeth in a row, a somewhat smaller tooth being external to the middle tooth of the three. Each lip bears a pair of conspicuous papillae, one of the pair being situated near each end of the lip and toward its base, and a third papilla near the middle of the lip base. The esophagus length is 4.8 per cent of the total body length.

MALE unknown.

FEMALE 24 mm. long, with a maximum diameter of 1.34 mm. The head is 90 μ long and 200 μ wide at the base. The collar in which the head is set is 324 μ wide. The teeth on the lips are about 12 μ long and about 10 μ wide at the base. The collar-like depression about the head is formed by the cuticle delimited by the first transverse striation. The third pseudo-annulus thus formed breaks on one side and runs obliquely back; this may be accidental (Fig. 3). The esophagus is 1.16 mm. long, the muscular portion being 526 μ long; the maximum width of the esophagus is 102 μ. The nerve ring surrounds the muscular esophagus at a point near its union with the glandular portion. The inconspicuous vulva is in the anterior portion of the body, 3.63 mm. from the anterior end. The vestibule of the ovejector (Fig. 4) proceeds inward a short distance and then turns toward the anterior end of the worm for a distance of about 0.6 mm., when it turns back past the vulva, the remainder of the genitalia lying in the posterior body between the vulva and the anus. The vestibule is 880 μ long. The succeeding portion, the unpaired portion of what Seurat calls the "trompe", which is the distal portion of the ovejector, is 2.16 mm. long and is directed posteriorly throughout. This bifurcates and the 2 branches form a loop and meet the corresponding portions of the uterus.

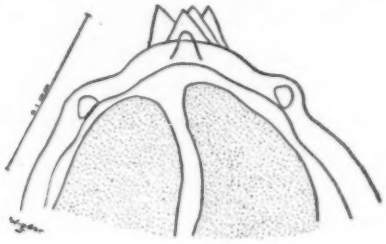

FIGURE 1. *Physaloptera rara*. Head. Lateral view.

The most posterior ovarian loops (Fig 5) are in the vicinity of the anal region. The anal aperture appears to be set deep in a depression formed by a fold of cuticle (Fig. 6). The external aperture of this cuticular depression is 420 μ from the posterior extremity of the body. The posterior extremity is comparatively blunt. This was the only specimen present, so there were no fertilized eggs in the worm.

HOST.—*Canis familiaris.*

LOCATION.—Duodenum.

LOCALITY.—Detroit, Michigan.

Seurat (1917) divides the species of *Physaloptera* from mammals into 2 groups; in one group, such worms as *Ph. clausa,* the

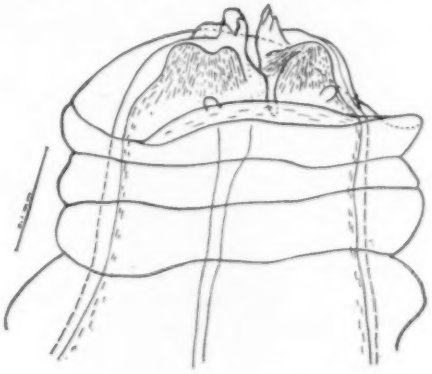

FIGURE 2. *Physaloptera rara.* Head. Dorso-ventral view.

external tooth of the lip is approximately as large as the internal teeth, the latter forming a 3-pronged fork; in the other group, such worms as *Ph. abbreviata,* the external tooth is very large and the internal teeth are small and set at intervals. *Ph. rara* evidently belongs in the first group. The surprisingly short glandular esophagus distinguishes this species from the other species with which we have compared it wherever this feature is described for other species. It is unfortunate that we have for study only a single specimen of the worm, as this feature is rather widely different from the corresponding condition in other species.

We take this occasion to summarize what is known in a general way of the nematode parasites of dogs in North America, thereby completing a series of papers on the parasites of dogs in North America. The other papers, published in recent issues of this journal, dealt with protozoan, cestode, trematode, acanthocephalid

and arthropod parasites. While these records are not exhaustive, they are the first comprehensive summary of our knowledge of the parasites of dogs on this continent.

NEMATODA. *Filaria osleri* was described from dogs in Canada by Osler (1877). It has since been found in Europe and has recently been reported again from this continent, after an interval of almost 40 years, by Milks (1916) at Ithaca, N. Y. The worm occurs in nodules in the trachea, bronchi and lungs.

Dirofilaria immitis was described from the heart blood of the dog in this country by Leidy (1856). The worm was subsequently

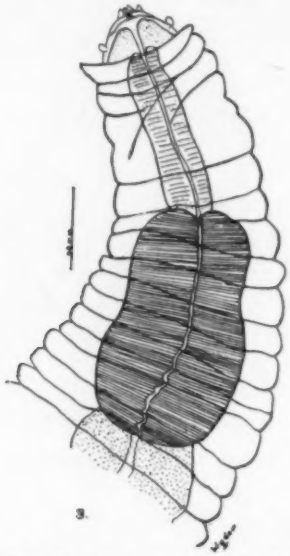

FIGURE 3. *Physaloptera rara.* Anterior extremity.

found to be widely distributed over the world. It has been reported a number of times from the United States, being collected by Curtice, Hassall, Wheeler and others. It does not appear to be uncommon in the South, but it is evidently uncommon in the northern United States. We have not found it in the post mortem examination of over 300 dogs at Detroit.

Spirocerca sanguinolenta (*Spiroptera sanguinolenta*) has been reported from a tumor of the esophagus in a dog at Washington by Sommer (1896). More recently, Haythorn and Ryan (1917) have reported 6 cases of the occurrence of this parasite in dogs at Mobile, Ala., and note that the U. S. Bureau of Animal Industry has specimens from one case at Atlanta, Ga., and from 2 cases at

Washington, one host said to be a lynx from the Zoological Park. (The other specimens at Washington are probably Sommer's.)

Trichuris depressiuscula, the whipworm, is a common parasite of dogs in the United States. We found it in 39.7 per cent of the first 300 dogs examined here by us, with an average of 21.4 worms per dog. The largest number present in a dog in this series was 677 and the next largest 299.

Trichinella spiralis has been experimentally developed by us in the dog here at Detroit.

Dioctophyme renale occurs in the kidney and abdominal cavity of the dog in the United States. The records of its occurrence in this country have been summarized by Riley (1916) and Hall (1916; 1917). Since the publication of these summaries, this parasite has been reported from the dog at Tama, Iowa, by Maxfield (1917), and in a paper by MacNider (1917) on nephropathy of the dog, we find the following: "At autopsy the kidneys of 4 of the animals were found to be the seat of infections by a parasitic worm, with surrounding areas of lymphocytic infiltration and connective tissue hyperplasia." These last cases are from North Carolina, and we regard them as probably cases of *D. renale*.

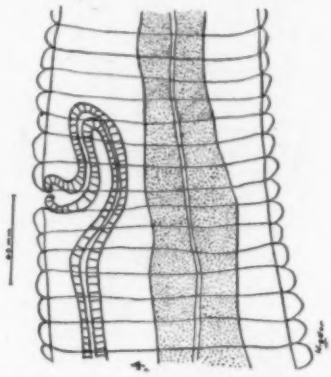

FIGURE 4. *Physaloptera rara*. Vulva region, showing loop of ovejector.

The occurrence of *D. renale* was reported by Hall (1917) in 2 dogs out of 67 dogs examined post mortem at Detroit. In a continuation of that series of examinations, this parasite was subsequently found by us in Dog No. 242, a mongrel male with some characteristics of the rough-coated terriers, so that our percentage for the series of 300 is only 1 per cent. The worm found was a male and was located in a tough cyst in the pelvic cavity to the

right of the urinary bladder. This appears to be an unusual location, as the worm is usually free, rather than encysted, when it occurs in the abdominal cavity.

Maxfield's case, MacNider's 4 cases and our case make a total of 6 cases that should be added to the totals for the United States. In addition, we note the following from a letter to one of us (Hall) from Dr. Ralph W. Nauss of the California State Board of Health: "I note what you say regarding the prevalence of *Dioctophyme renale* among dogs in Chicago. This parasite was frequently found in dogs during my student days—1902-5—at the Northwestern University Medical College. On a later occasion, in 1911, when

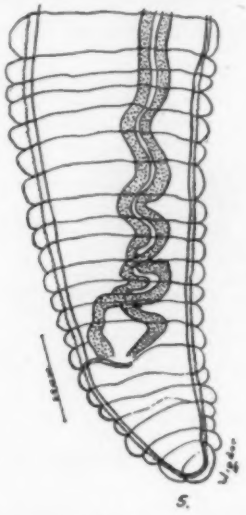

FIGURE 5. *Physaloptera rara.* Posterior extremity, showing ovarian loops.

doing experimental surgery on dogs at this same institution, one case I remember distinctly of finding a female in the right kidney and a male (quite small in comparison with the one contained in the kidney) in the abdominal cavity beneath the liver." The new cases listed here make it reasonably certain that this parasite has been found in the United States in at least 50 cases and probably in more than 50 cases. In a general way the distribution of the cases follows the Atlantic sea-board and the Great Lakes region, a distribution which is in accord with the supposition that the parasite has an intermediate stage in fish.

Ancylostoma caninum, the common dog hookworm, is generally distributed over the United States, though the available evidence

indicates that it is more common in the South, as might be expected. However, it might be noted in passing that very little has ever been published regarding the parasites of southern dogs. We found hookworms in 33.3 per cent of our series of 300 dogs, with an average of 15.2 worms per dog. The largest number present was 282, and the next largest number was 165.

Uncinaria stenocephala has only been reported once, by Muldoon (1916), from the dog in the United States. Muldoon reported it from Ithaca, N. Y.; from correspondence it appears that no specimens of the worm were preserved. This is unfortunate,

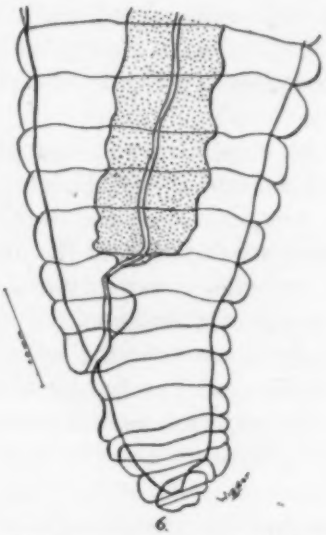

FIGURE 6. *Physaloptera rara.* Posterior extremity.

as the record was published without corroborative data and there is a possibility of misidentification.

Belascaris marginata is the roundworm which appears to be most common in dogs in the United States. We found ascarids (the majority of them *B. marginata*) in 53.3 per cent of our 300 dogs, over half of them, with an average of 25.2 worms per dog. The largest number present was 2054, and the next largest was 204. Without this extremely large number, 2054, the average per dog was 12.3.

Toxascaris limbata appears to be much less common in this country than the foregoing species. Ransom (1913) reports *Toxascaris* from the dog, apparently at Chicago. We recently found

specimens of this species fairly common in our ascarid material from dogs.

Agamonematodum gaylordi was described from tubercles in the hyperplastic thyroids of experiment dogs at Craig Brook, Maine, by Ransom (1914).

Heavy Infestations. Dog No. 170 had 2054 ascarids (*B. marginata*), most of them very small immature worms. Following anthelmintic treatment, 5 of these worms had been collected from the feces and 64 had been collected post mortem from the large intestine and cecum and credited to the efficacy of the anthelmintic. Of the remainder, 89 were found in the stomach and 1,896 in the small intestine. Some of the very small larvae might have been passed in the feces and escaped detection, so that there is a possibility that there were even more ascarids present than the large number accounted for.

This dog was much emaciated and had prominently enlarged thyroids. The animal received 2 anthelmintic treatments, the second 5 days after the first, and died the evening after the second treatment. Death was probably due to the cachectic condition of the animal, which in turn was apparently due to the gross infestation with ascarids, though the anthelmintic treatment in such a weakened animal may have hastened the end. Post mortem examination showed the following: The margin of the left lobes of the lung were congested; the external vessels of the heart seemed congested; the liver was cirrhotic; the spleen was dry and tough; the peripheral portion of the medulla of the kidneys was hyperemic; the bladder was distended; the gastric mucosa was gelatinous and showed some dark areas that apparently had been hemorrhagic; the jejunum showed locally inflamed areas and the ileum was inflamed and had some local hemorrhages; the colon was inflamed, the rectum hemorrhagic, and the glands of the rectum and cecum were very prominent.

Some of the young ascarids collected from this dog were put in Kronecker's solution (a slightly alkaline physiologic saline solution), where they lived for 64 hours with a room temperature of about 26° C. The adults of this dog ascarid were found by Hall (1917) to survive for 14 days in Kronecker's solution.

To get some information in regard to the developmental period of these ascarids, 30 young worms, none of them more than 1 cm. long, were put in gelatine capsules and fed to Dog. No. 173. The

feces of this dog had been examined for the five-day period previous to the feeding and once 3 days before and no worm eggs of any sort had been found. Ascarid eggs first appeared in the feces 11 days after the feeding the worms to the dog, indicating that the female ascarid of the dog attains maturity and begins egg production within 11 days after reaching a length of about 1 cm. This dog was killed 48 days after these ascarids were fed to it. During that time the dog had vomited 3 ascarids on one occasion and 7 on another occasion. On post mortem examination the dog had 83 ascarids, which with the 10 worms vomited makes a total of 93 ascarids following the feeding of only 30 ascarids. We may assume that immature worms were present during the period when fecal examination showed the absence of eggs, or that the dog acquired the additional worms from eggs in the feces as a result of the experimental infestation, or that the dog acquired the additional worms from eggs present in the cage from previously infested dogs. Experiments noted below indicate that the second assumption is a possibility.

The experiment in infecting this dog with ascarids is of interest in connection with the work of Stewart (1916; 1917) and of Ransom and Foster (1917), on the life history of ascarids. Stewart demonstrated experimentally that when infective eggs from ascarids of man or of swine were fed to rats or mice, the embryos would escape from the eggs in the digestive tract and subsequently appear in the liver, spleen and lungs, later stages apparently migrating from the lungs up the trachea to the mouth and ultimately being swallowed in saliva and attaining the intestines, where they did not develop, but passed out in the feces. In view of the general failure which had followed most of the attempts to infect animals directly with infective eggs of suitable ascarids, Stewart concluded that rats and mice acted as intermediate hosts of ascarids, the infective larvae escaping in the saliva or feces of the rat and presumably attaining their definitive host in contaminated food or water. Ransom and Foster have stated that Stewart's conclusions do not necessarily follow from his findings, and we suspect that most helminthologists at present would agree with Ransom and Foster in this, even though inclined to give all due credit to Stewart for what is evidently a very interesting and valuable piece of work. Ransom and Foster have confirmed Stewart's work experimentally and have obtained similar results with guinea pigs. They

further note one case where a young pig was fed ascarid eggs and died a week later; numerous ascarid larvae were found in the lungs, trachea and pharynx. They correlate this finding with Epstein's (1892) success in developing *Ascaris lumbricoides* of man by feeding eggs to young subjects, and state that age is an important factor in determining susceptibility to ascarid infestation.

In the case of Dog. No. 173, the animal was in a wire cage with a solid metal bottom and the cage was placed on top of some similar, but larger, cages which usually contained dogs. We consider this a location that would not be much disturbed by rats or mice which might infect the food or water of the dog in the cage, especially as the building is a concrete rat-proof structure with practically no place for rats or mice to hide except in the dog cages. The only food that might have come in contact with rodents is the stale bread, but this is furnished in entire loaves, free from rodent feces and, so far as we have noticed, apparently free from tooth marks that might indicate the presence of rodent saliva. The indications are that this dog acquired his infestation with worms in excess of the 30 originally fed to it, by contamination of food or water with eggs from the original worms.

In this connection it might be noted that Ransom and Foster call attention to the fact that heavy infestations of the lungs in rats and mice produce a serious pneumonia which is frequently fatal, and conclude that it is not improbable that ascarids are frequently responsible for lung troubles in children, pigs and other young animals. In the case of Dog No. 170, there was a congestion of the margins of one lung found post mortem, as noted, but it is difficult to correlate this with the ascariasis. The recent invasion of the lungs by about 2000 ascarids should theoretically give rise to a generalized pneumonic condition, if anything, rather than a congestion confined to the margin of the left lobes; still, inflammation might have occurred and subsided. We do not disagree with their conclusions and we regard the ascarid as a dangerous parasite, but in this case the presence of so many young ascarids in the intestine with a lack of the lung condition which might be expected suggests to us that the injury to the lung in the case of the rat and mouse fed with human or pig ascarids is partly due to the fact that these worms were in an unusual host, a condition which often leads to added injury. Thus in our experience trichinae in rats do not give the thermal and other clinical condi-

tions found in man, the reaction in man, the unusual host, being much more severe. It is also true that the large clinical experience of the world in dealing with so common a parasite as the ascarid has credited it with the production of a wide range of symptoms in connection with the gastro-intestinal tract and the nervous system, but pneumonic conditions, except from the invasion of the lung by the wandering adult worm, do not seem to have been associated with it. Of course, clinical experience may be at fault here, as it has been in other instances.

In connection with the well-known wandering habits of the adult ascarid, it may be noted that this habit of entering the ducts of the pancreas and the liver and of traveling up the esophagus and leaving the pharynx by way of the nares, the trachea or the Eustachian tubes is apparently much more common in the case of the ascarids of man and swine than in the case of the ascarids of the dog. We have only seen one such case in the dog. This animal, a six-months-old pup, was found dead one morning with an ascarid projecting from one of the anterior nares. Behind it was another worm. On removing the head, another ascarid was found in the pharynx and posterior nares. Another worm was found in one bronchus. There were 19 worms in the intestine. Apparently death was due to these ascarids. The possibility of post mortem wandering cannot, of course, be absolutely excluded, but in our experience post mortem wandering of parasites in the dog must be a very rare thing, as we have almost no evidence of it.

We had one case of severe infestation with whipworms, a rough count showing approximately 677 worms, of which 421 were in the cecum and 253 in the colon and rectum to within 3 inches of the anus. In the cecum there was a mild hyperemia associated with the attachment of the worms.

Multiple Infestations. Of our 300 dogs, 156 had only one kind of nematode worms, 91 had 2 kinds, 21 had 3 kinds, and none had more than 3 kinds.

Culture Methods for Eggs. The culture method recommended for coccidia by Cole and Hadley (1910), the use of a 10 per cent potassium bichromate solution, gave us very good results in culturing ascarid and hookworm eggs. At room temperatures of 20° to 29° C. ascarid eggs would form the two-celled stage overnight. In 4 days embryos could be seen moving about in the eggs. Ascarid eggs kept under the same conditions, but in a solution of

tap water, showed the two-celled stage in about half the eggs in 18 days, the other half being still in the one-celled stage.

Hookworm eggs in the potassium bichromate solution at room temperatures of 20° to 23° C. showed actively motile embryos within 36 hours.

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HISTORICAL FACTS CONCERNING THE PATHOLOGY OF SPAVIN*

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The term *spavin* apparently had its origin from the Latin *spavenius* used by Jordanus Ruffus in the middle of the 13th century. Originally it indicated various pathological processes in the neighborhood of the tarsal joint. Later the term became confined to disease processes occurring on the median side of the tarsus. Due to the different externally noticeable changes in the hock joint there are modifying terms used as prefixes to the term *spavin*, such as *bog, blood, moist, dry* or *bone, occult spavin*, etc.

There was at one time considerable confusion in the classification of spavin. DeSolleysel used the term *dry spavin* for lameness resembling spavin lameness but which did not originate from spavin. True spavin he named ox spavin. Saunier introduced the term *muddy spavin*, a form of spavin usually occurring in horses raised in damp, marshy localities. Gibson selected the term *bone spavin* because the swelling is of a hard consistency and also to distinguish it from a *soft blood spavin*. Bourgelat (1789) acknowledged only one form of spavin which he named *callous spavin*. By the term dry spavin he understood a form of lameness originating in the muscles and their nerves. He considered *ox spavin* as a swelling on the median side of the hock joint arising from stagnated lymph which is at first soft, later becoming hard as gypsum and very commonly occurring in oxen.

At the present time spavin is considered to begin by a rarefying ostitis in the subchondral bone, spreading to the joint to form erosions and ankylosis, and to the periosteum to form exostoses.

The knowledge of the pathology of spavin was, up to the beginning of the 19th century, very meagre. There were a large number of theories concerning the development of the thickening on the median surface of the hock joint. The basis of most of these theories is in harmony with the medical view of humoral pathology at that time.

*The publication of these notes was prompted by the fact that most of this literature is not available to the English speaking veterinarians.

Thomas de Gray in 1639 wrote "A splint is, in the beginning, a very gristle. However, if it be long left alone, it will come to be a hard bone or excression. A ring bone begins first with a slimy humour which in time groweth to a hard gristle. * * * A dry or bone spavin is a great hard crust as hard as a bone if it is let run, sticking or indeed growing to the bone."

Gibson (1754) places the origin of spavin in a soaking of the ligaments with moisture which condenses, forming a swelling composed of hardened glue which later grows like the callous of a fractured bone resembling a piece of flint without any visible pores, except the foramina for the passage of nerves and blood vessels such as are found in other bones that compose the skeleton.

According to vonSind (1770), strong muscular exertion produces an irritation in the vessels allowing the escape of the juices. These juices accumulate in the joint ligaments and on account of their corrosive nature act upon these parts producing a gradually hardening callous known as spavin.

Laffosse (1772), who places the cause and development of spavin in the same class as coronary ringbone, gives the changes as follows: "Following excessive work on heavily strained fibres, they lose their power of speed and cease to require the circulation of lymph. The latter stops, hardens, and causes a stiffness or tension which is at first of an inflammatory nature but soon becomes separated and a sort of horny growth results."

DeSolleysel (1775) thought that the bony swelling arises on the inner and lower part of the hock joint through a confluence of cold humours that gradually becomes bone hard by evaporation and dissolution of its delicate substances.

VonBusch (1788) wrote, "Spavin is, indisputably no other than this lymph becoming thickened in many ways, and finally hardened. The ligaments, cartilage and tendons of the hind knee joint contain especially numerous circulatory vessels for the purpose of nourishment. The lymph contained in these vessels becomes tenacious by lengthy inactivity, sudden chilling, etc. It thickens and gradually accumulates. Thus, the spavin begins."

In 1800, Taplin wrote, "A splint is either an enlargement of the periosteum by an original rupture of small vessels, and the extravasated fluid collected and indurated by time or, it is a callosity originally formed upon the bone and becoming ossified, constitutes a bony substance, seeming a deformed part of the bone itself.

* * * A bone spavin is exactly in a greater degree behind what a splint is acknowledged to be before."

Von Rohlwes (1801) treats spavin as follows: "Violent stretching of the binding tendons of the hock joint excites an inflammation at the points of attachment. An inflammation invariably causes an afflux of juices which bring about a thickening of the bone itself. Every bone is covered by a strong membrane. Should this membrane become injured, the bone becomes free to enlarge. Hence, whenever the membrane is injured by an inflammation brought about by an afflux of juices, the bone becomes thickened."

Havemann in 1805 was the first to show that in spavin the articular surfaces themselves are diseased. He says, "The cause of the lameness lies always in the diseased articular surfaces. The lameness begins as soon as the articular surfaces of the flat bones become denuded of cartilage. This is followed by a sort of growing together of the bones." He distinguishes between the hard or bone spavin, the soft or moist spavin, and the occult or invisible spavin.

Von Arnim (1806) considers the cause of spavin similar to that of rheumatism, and a cure very difficult or impossible.

Von Hochstetter (1824) combines under the term spavin all harmful influences diminishing the strength or the flexibility of the hock joint. He considers forceful injury and swelling of the tibial flexor as the cause of bone spavin.

Dietrichs (1829) supports Havemann's view. He says that spavin is a local disease of the hock joint affecting the articular surfaces. He is of the opinion that the primary lesion is in one or more of the articular cartilages of the hock joint.

Regarding occult spavin he says, "The swelling is, in many cases, unimportant. It is hardly visible, and yet the animal shows marked lameness. This is usually the case when the spavin is observed in the process of development, at the stage when the articular cartilages mainly, are affected and before the bones are grown together."

According to E. F. Gurlt (1831) spavin is a disease of the horse characterized by exostoses on the median side of the hock joint associated by ankylosis of the articular surfaces and ossification of the ligaments. Like von Rohlwes, he considers that the bony outgrowth comes out of the bone itself following a disease of the periosteum. He says that too little is known about the changes

in the cartilage to form an opinion. He asserts also that the growing together of the central with the third tarsus and the latter with the metatarsus usually occurs first.

Hering (1834) supports, in general, Havemann's ideas about spavin. He asserts, however, that not very seldom diseased articular cartilages are found which are not associated with lameness of the horse. Also that in *visible spavin* the articular surfaces are usually found unchanged.

Havemann's spavin theory is further supported by G. W. Schrader (1839). In his numerous investigations of diseased hock joints he found that, as a rule, the articular surfaces between the central and third tarsus are the first to suffer. This chondritis is followed by suppuration of the articular cartilages resulting in caries of the bones that are sooner or later united. According to his view the exostoses appear only after the articular surfaces are markedly diseased and the external border of the third tarsus has been affected by caries. He also points out the fact that many horses without exostoses show marked lameness, while others with exostoses show slight or no lameness.

Bartels (1843) claims that spavin originated with an inflammation of the tendinous attachment of the hock joint. In place of *visible* and *occult* spavin he uses the terms *tarsal* and *navicular spavin*. He used the former where the spavin is located in the upper part of the hock joint accompanied by long standing lameness. The latter, where the spavin is situated in the central and third tarsus not accompanied by lameness of the animal.

Bouley (1850) expressed his opinion that the affection of the articular surfaces is of marked importance in spavin. He says, "Spavin is not an external swelling situated at the articular margin of the flat tarsal bones alone. It is more than that. It is a constant expression of an internal lesion of the articulations of these bones as well."

According to Hertwig (1850) every bony outgrowth on the inner side of the hock joint should be considered as spavin. In very few cases this outgrowth begins as an acute inflammation of the ligaments and the bone, brought about by external injuries to the hock joint. It begins more often as a chronic inflammation, principally of the bone. In such a hock joint the bone is found redder, more vascular, and more porous than normal. The periosteum is slightly thickened and between the bone and periosteum there is found

some coagulable liquid. Then the spavin outgrowth arises. In spavin without exostosis, the process begins in the articular surfaces or in the tissue of the bone itself. He holds that, besides strong exertions and kicks, rheumatism may be the cause of this affection. Later Hertwig said that the changes arising in the joint always follow a chronic arthritis.

According to Lawrence (1850) stiff joint or anchylosis arises from some accidental wound in the joint, in which case the synovia escapes outwards. This escape of the synovia occasions great irritation and inflammation, and if the orifice of the wound is not soon closed, the membranes begin to thicken, bony matter is thrown out from the heads of the bones, thereby uniting them in one mass, and the use of the joint is gone. * * * The inflammation from a wounded joint is very different from that which takes place in any muscular part. For as ligaments are not so vascular as muscles, they are consequently much slower in forming granulations, or, in other words, they possess not so perfectly the powers of regeneration.

E. Gurlt (1853) considers spavin a chronic arthritis affecting first the articulation between the central and third tarsus and later the ligaments that bind these bones and the periosteum. He remarks that the swelling and the ankylosing exostosis take place exclusively on the median side of the tarsus. The calcaneo-astragalar articulation as well as that between the astragalus and the central tarsus remain free when they are surrounded by bony outgrowths.

O. F. W. Schrader, Jr. (1860) examined many hock joints of horses that he treated for spavin during life. He considers spavin to be a chronic arthritis with the following possibilities: The process may begin in the cartilage due to strong and continued injurious influences such as pressure which causes a weakening and destruction of the cartilage followed by an affection of the bones. The synovial membrane may be primarily diseased. This causes a diminished amount of synovia or a diseased synovia which in turn affects the cartilage. Finally the subchondral bone may become primarily diseased by repeated jarring, pressure, etc. This causes a disturbed nutrition followed by necrosis of the cartilage.

Anacker (1864) claims that spavin is a chronic deforming and proliferating arthritis. He considers the changes in the cartilage as an amyloid process.

According to the researches of Stockfleth (1869) the inflammatory process in spavin may originate in the ligaments, or in the articular surfaces. In the former the symptom complex arises as a chronic inflammation of the capsular ligament. In the latter the seat of origin is in the median part of the articular surfaces whence it spreads slowly. The articular cartilage gradually disappears and the denuded ends of the bones may grow together.

According to Dieckerhoff (1875) spavin is a complicated chronic inflammatory process originating in the inner leaf of the bursa of the fanshaped muscular attachment of the tendon of the tibial flexor. From here it spreads to the capsular ligament and to the periosum of the lower part of the hock joint producing a chronic synovitis, a softening and dissolution of the articular cartilage, and an inflammation of the bone marrow.

Among the etiological factors he mentions a faulty histological setting in the structure of the hock joint as well as defective body structure, a peculiar temperament, and external influences, such as excessive exertions of the horse, especially excessive burdening of the posterior extremities.

In 1880, Gotti, after examining a large number of hock joints mostly from horses showing spavin symptoms during life, concluded that spavin originates in the bones of the hock joint. He found that the process usually begins with a very slow ostitis of the central and third tarsus and of the metatarsus. In the course of this ostitis there is a widening of the Haversian vessels causing a nutritive disturbance of the bony connective tissue. The latter is finally transformed into plastic marrow tissue which produces a decalcification of the bone. The ostitis later leads to a chondritis characterized by a slow and continued inflammation of the articular cartilage accompanied by active proliferation and destruction of the ground substance.

In the inflammatory process of the bone, Gotti recognized two stages. A destructive period, during which the newly formed marrow tends to spread slowly, and a regenerative period during which the newly formed marrow tends to be transformed into compact connective or bony tissue. Should the proliferating process reach the articular surfaces, it is possible for the marrow elements to be transformed into osseous tissue and lead to a true ankylosis.

He considered the formation of osteophytes as secondary, usu-

ally following the disorder of the joint, and developing at the time when the changes have reached the margin of the articular surfaces.

According to von Klemm (1887) the etiology of spavin is as follows: "In all cases where the heel is trimmed low the hock joint is excessively extended through the forward pressure on the joint by the tendon of the flexor pedis. This is the case when the thigh is loaded. In connection with this extension there is undoubtedly an excessive tension of both tibial flexors which, with their five tendinous heads must, in their turn, have an injurious effect on the points of insertion around the hock joint. Should the horse be cow hocked or the median side wall trimmed low, the injury occurs only on the median tendons thus bring about a spavin." He stated that in fifteen military horses whose heels were trimmed particularly low, nine showed spavin in from one to two months.

Bayer (1890) supported the views of Gotti.

Müller considers spavin as a *chronic deforming arthritis.*

According to Pflug (1892) the exostoses are the primary lesions of spavin. He considers them as arising from an inflammatory process, an *ossifying periarthritis* which is often complicated by an arthritis.

Hoffman (1892) at first supported Dieckerhoff's views of spavin. Later he declared that spavin is an inflammation of the bone, a hyperemia leading to a *rarefying ostitis* and finally to formation of lacunae.

Höhne considers spavin not as a primary disease of the hock joint but as a complication of gonitis.

Smith (1893) differentiates between an *articular* and a *non-articular* form of spavin. He considers spavin to be a *chronic deforming arthritis.*

An interesting treatise of spavin appeared in 1893 by Aronsohn. He summarizes as follows:

1. Spavin begins with a periostitis brought about by an injury to the median terminal tendons of the tibialis anticus and by overstretching the long and short lateral ligaments. This periostitis leads to exostoses on the median surface of the hock joint.

2. The arthritis is mostly secondary and occurs only on both lower articulations of the hock joint.

3. The capsular ligament and the synovial membrane of this joint show only slight changes. An enlargement of the synovial villi is, macroscopically, not shown.

4. There is very little proliferation of the articular cartilage before degeneration takes place. Peripheral proliferation of the articular surfaces followed by ossification is never found. Eburnation of the denuded bone is likewise not seen.

5. Free bodies are never found in this joint.

6. Eventually, the disease process leads to a partial, rarely to a complete, osseous ankylosis of the articular ends. The latter is never found in the tarso-metatarsal articulation.

7. Atrophy of the tarsal bones is rare. When it occurs, it is hidden by the articular ends and by the ossifying periostitis. The endosteal changes consist of an osteoporosis and an osteosclerosis. They do not influence the periosteal formation of bone.

8. The affection of the tibio-astragalar joint consisting of a fibrous thickening of the capsular ligament and a proliferating inflammation of the synovial villi is a secondary complication of spavin.

He admits that an arthritis may cause a periarthritis and all the above described changes; but he claims never to have noticed, in spavin, diseased articular surfaces without any changes in the periosteum. He holds that those cases where there are erosions on the edge of the articular surface without any periarthritic changes, indicate nutritive or functional disturbances without any important significance. He thinks it unlikely that the small joints of the tarsus, on account of their rigid structure and naturally limited movement, should be primarily diseased.

According to Eberlein (1898) the process begins by a reddening and softening of the subchondral bone of the central and the third tarsus, at the anterior and median part of the joint and 2 or 3 mm. from the margin. This spreads towards the articular cartilages to form erosions, and towards the periosteum to form exostoses.

The synovia is diminished to but a few drops. It is alkaline in reaction and of normal appearance. In cases of ankylosis, it thickens and gradually disappears. He did not find any bacteria in the synovia, in the bone, or in the cartilage.

The cartilage is at first changed in color. It is bluish red instead of whitish, and dull instead of shiny. Later there begins a superficial fibrillation followed by deeper destruction of the cartilage. This becomes noticeable as punctiform erosions which later become confluent resulting in elongated erosions.

Microscopically the earliest change is an increased number of lymphoid marrow cells in the Haversian canals. These are at first lined along the walls of the canals. Later they are gradually increased in number until the canals are completely filled, and they appear as proliferating granulation tissue. At the same time there is a disappearance of the bony tissue, indicated by a widening of the canals. This widening takes place in various directions so that the Haversian canals become irregular in shape. The dissolution of the bone is accomplished by numerous giant cells, osteoclasts, that originate, according to Kölliker, from the osteoblasts. This process is known as *rarefying ostitis* or *inflammatory osteoporosis.*

Soon after this resorptive process there appears a regenerative process in which there is a new formation of bone, known as *osteosclerosis* or condensing ostitis. This process tends to counterbalance the damage done by the previous process so that finally the bone becomes even denser than the original bone.

The osteo-porosis spreads to the neighboring parts and causes therein a destructive process. In this manner it reaches the articular surfaces. Here, however, it is checked by the articular cartilage. The granulation tissue then spreads out beneath the cartilagenous surface causing a disturbed nutrition of the articular cartilage. This is followed by a fibrillation of the upper and a softening of the deeper layers of the cartilage. Together, they produce a splitting and a sinking of the articular cartilage. Usually, however, there occurs a true chondritis in the form of progressive and retrograde inflammatory processes. In this case the inflammation of the bone affects the cartilage directly producing a proliferation of the cartilage cells. The number of cells is increased and they lie together in groups. Between these groups of cells there are round or oblong, large multinucleated giant cells which produce a degeneration and resorption of the newly formed cells. This results in a loosening and fibrillation of the cartilage and in a destruction of the ground substance, and is eventually followed by a splitting of the cartilage. The proliferating granulation tissue very often simply penetrates the cartilage, i. e., it grows into the cartilage and dissolves it until it reaches the articular surface. Should the osteosclerosis now quickly follow, the chondritis may cease, and there may remain on the articular surface white punctiform elevations, the so-called *lime points.* In other cases the chondritis spreads rapidly and leads to a destruction of the articular cartilage.

There is often found ankylosis between individual bones, particularly between the central and the third tarsus. This growing together of the bones may be in the form of a pseudo-ankylosis produced by fingershaped hyperostoses gripping one another, or it may be in the form of osseous ankylosis arising from the articular surfaces. The latter does not take place over the entire articular surface but in parts of it, so that on section of the joint there are seen elongated fissures in ankylosed parts of the joint. There is, therefore, only partial ankylosis as a rule and rarely only complete ankylosis. Eberlein claims never to have seen a fibrous or cartilagenous ankylosis, so that he regards ankylosis in spavin as being exclusively of an osseous nature.

Etiologically, he holds that spavin is due to pressure on the smaller bones of the hock joint. The extrinsic causes for this pressure are overstraining of the hock joint due to too quick movements, jumping, heavy loads, improper shoeing, etc. The intrinsic cause consists of an internal anlage due to faulty conformation of the hock, to temperament, and to the age of the animal. Heavy musculature in the pelvic region predisposes to spavin, particularly when the hock joint is not built correspondingly strong. A long dorsum is also a predisposing factor. Horses with violent temperaments are more susceptible to spavin than phlegmatic horses. This is so because they attempt their work with greater exertion. Young horses are affected more often than older ones.

In affected joints the erosion is at first noticed 2 or 3 mm. from the margin. The reason for this lies, according to Eberlein, in the form of the articular surface. He claims that if pressure is exerted on a joint after it has been freed from its ligaments, it will be seen that the *closing border* is not at the margin of the joint, but a few mm. from it. On account of this fact, every mechanical lesion will exert itself more heavily on this closing border, so that the first inflammatory changes must occur on this part of the bone and cartilage.

This view of Eberlein that spavin begins in the subchondral bone is accepted today by most veterinarians. Hertwig (1850) was the first to point out this possibility and Gotti was the first to assert that it always begins in the subchondral bone. Williams claims that spavin is a local manifestation of a general disease.

Some French authors (Kitt) claim that diseases through which young animals pass predispose them to this condition.

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JUSTIN MORGAN—THE MAN AND THE HORSE*

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The Morgan Horse was at his top notch when Hale's Green Mountain Morgan, in 1851, swept the country from Vermont to Massachusetts, as perhaps the most sensational animal that had ever appeared in America.

For twenty years the Morgans held their popularity. It was only after the Civil War that their decadence began, when the *craze for speed*, started by the wonderful career of Dexter, caused everyone to turn his attention to the long striding trotters, represented by the descendants of Rysdyk's Hambletonian.

Those were the years when Hambletonian stallions began to be taken to Vermont and bred on Morgan mares, hoping to produce fast trotters. The result was disastrous. Environment was against the violent cross. The breeders failed to get what they expected, and spoiled what they had.

Not until about 1890 did the supreme folly of the experiment thoroughly impress those who had known the excellence of the original Morgan stock, either from personal experience or the statements of those who had owned and driven them.

At about that period classes began to be made for "Morgans conforming most nearly to the original type". It was discovered that very few were left, and they were to be found only in those parts of Vermont, such as Caledonia County, in the neighborhood of St. Johnsbury, where the hills were so steep, and the roads so

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ill adapted to extreme speed, that none but the old fashioned type, with their short sharp trotting gait, with no sign of straddle behind, no inclination to pace, built low to the ground and substantial in form, could live.

Ethan Allen 3rd, a much inbred descendant of Hale's Green Mountain Morgan, was one of the first to command recognition as the true type of Morgan horse. He was bought and taken west the second year after he showed up a winner. Fortunately, after 16 or 17 years' absence, when 24 years old, his limited offspring attracted attention and he was brought back to Caledonia County, where he lived his last 3 or 4 years, leaving possibly about 100 descendants in Vermont and adjoining states.

Ethan Allen 3rd was a son of Ethan Allen 2nd, and strongly inbred to Peter's Vermont, and other blood which had been kept untainted by the men of the Peter's family, the Orcutts, and the Ides, who stand as sponsors for sound Morgan breeding just as the Booths and the Bates families have in the history of English Short Horn cattle.

Other sons of Ethan Allen 3rd were Mcginnis' Comet and Ethan Allen 4th (both dead), Bob Morgan, Rob Roy, Croydon Prince, Morgan Falcon, Delvyn. These are the horses that have helped to uphold the lines of Hale's Green Mountain Morgan in the home state.

Many excellent mares, bred in these lines, were taken West, some to western New York, Ohio, Illinois, others to Virginia, and some even as far west as the State of Washington. Their names and location were made a study by Mr. Henry S. Wardner, the first president of the Morgan Horse Club, in which work he was aided by the cooperation of Dr. A. H. Hinman of Dundee, Ill.

Another branch of the Morgan family, one of the very best, is that starting with Billy Root, an impressive sire, whose prepotency carries to our own day. Billy Roberts, of late years, was the most typical scion of that branch of the Morgan family, Lyndon, and Reynard, own brothers, in two of the most conspicuous Morgan breeding studs of Vermont, still hold up the Billy Root end. Some of the best Morgan brood mares are recognized as from the Billy Root blood.

A combination of these strains has been brought back to Vermont, in Jerome, an aged stallion; thus, it appears that there still exists a few representatives of the original Morgan strain.

Justin Morgan, the horse, was foaled in 1789 and died in 1821; Sherman Morgan foaled in 1808, died 1835. From that time up to 1848 Bulrush Morgan, Woodbury Morgan, Royal Morgan, Gifford Morgan and Vermont Morgan were the prominent descendants. After that Billie Root, Black Hawk, Hale's Green Mountain Morgan, Morrill, Flying Morgan, the Streeter Horse, and Stockbridge Chief were recognized as the best examples of Morgan blood. Just subsequent to this, Ethan Allen, Peter's Vermont Morgan, Goldust, and Gen. Knox were quite famous.

Later on, the breeding of Morgan stallions are susceptible of verification, in which connection comes the thought that it is to be regretted that equine history is not written when it is made.

Reverting to Justin Morgan, there has been and exists today, a well definited uncertainty as to his true breeding. On conformation and type, anyone who has been a keen and interested observer, would be inclined to think that the theory that he was a Dutch horse correct. There must be something in the old saying that "like begets like" while on the other hand such authorities as Linsley and Joseph Battell published pedigrees of Justin Morgan that clearly indicate his descent from Byerly Turk and Godolphin Arabian, and his dam by Diamond son of Wildair. Take your choice.

Whatever the truth may be, nothing is more certain than that the Morgan horse was, and is a good one and that it is difficult to indicate any service for which he is not useful. The records made by the breed on the track, in cavalry service during the Civil War, and his nature in rugged New England country are an open book. He is without question one of the most useful horses known and the preservation of the breed, as a breed, is to my mind of paramount importance. The breeding should be perpetuated under conditions that will not include what some people call, an improved type. Hale's Green Mountain, son of Gifford, has been wisely adopted by the Morgan Horse Club as the model type. Is it not good enough?

Man developed civilization, but not alone; side by side, prospering and suffering together has been his best ally, the horse. As the Pony Express, at the plough, or hitched to the crude stone boat he has drawn sap through the New England sugar bush, and carried the country doctors and circuit riders on their errands of mercy; why shouldn't we talk about him? Nowadays our lives, yes, even our thoughts, have become so artificial that it is far cry

from early New England days when the ties that bound our forefathers to their horses were closely interwoven.

In 1837 the 1st Dragoon Guards from England were mounted on Morgans from Vermont and pronounced by their officers as fully the equal of the best English troop horses.

Twenty-four years later the 1st Vermont Cavalry went to southern battlefields mounted on Morgan horses and records prove them to be the best and most efficient cavalry regiment in the Federal Army.

It makes but little difference as to a verified ancestry. Justin Morgan must have been well bred to accomplish what he did, endowing his offspring with the power of perpetuating his good qualities through generations from his to the present one. As the Morgan Horse Club say, "for all practical purposes of the Morgan horse breeder of today, Justin Morgan may be regarded as "Adam".

With this introduction let us go somewhat in detail as to both Justin Morgan, the man, and Justin Morgan, the horse, in which connection I desire to thank Mr. Wm. H. Gocher of Hartford, Conn., for most of the valuable information upon which it is based. Mr. Gocher, as secretary of the National Trotting Association, has given the subject most careful investigation and his opinion is recognized as worthy of most serious consideration.

Within a radius of fifty miles of the grounds of the Vermont State Agricultural Society, there was laid between 1795 and 1821, the foundation of a breed of horses which have carried the name of Vermont over the world. It established a type which became the trademark of the first great American family of horses and it is so distinct and different from all others that when an Australian, a South American or an Englishman refers to a horse as a "Vermont Morgan" an idea of his general appearance is conveyed as lucidly to the residents of these countries as it would be if addressed to a New Englander.

As is well known, Ethan Allen won his honors as a trotter. He was the champion four-year-old stallion of his time, and when Magna Charta, Fearnaught and Lady Maud acquired championship honors, those who were breeding utility Morgans made an effort to produce trotters. This was an error which the Morgan Horse Club has done more than any other organization to point out, as the compact form of Morgan is not what can be looked for in the champion trotter of today, although a dash of the blood adds

finish to many of the plainer families, as is well illustrated in Uhlan, the fastest trotter that the world has seen. This blending with other lines, however, has in a measure shown good results as on account of it, strains of Morgan blood can be found in the pedigree of many of the greatest trotters, and show ring winners both in harness and saddle classes.

For the first few generations, the Morgan was a male line family. The breeding of the dams of all the early stallions of note is either unknown or when known traces to horses that did not possess in a marked degree any of the qualities which made their descendants famous. The germ of merit came from the sire, and notwithstanding this method of breeding, the original type for a time increased in size and was reproduced so uniformly that it became fixed in New England.

The breed which passed into history as the Morgan horse bears the name of the man who brought the tap root to Vermont in 1795, and while he was always in humble circumstances, and died in debt under the roof of a friend who had adopted two of his children, his fame will endure beyond the advent of the much heralded, but evidently remote, horseless age.

Justin Morgan, the man, was born in 1747, in or near Springfield, Mass. Upon arriving at the age of twenty, he developed tubercular symptoms and as he was unfitted for heavy work on a farm, he took up school teaching, giving singing lessons, standing other people's stallions for public service and finally keeping a tavern for a living. Up to 1788 he was located at West Springfield, Mass., and at that time owned two-thirds of an acre of land on which there was a house and barn. While there among other horses, he had in 1784, one from East Hartford, Conn., named True Briton. He was also known as Beautiful Bay and later as Traveller, and had been standing for service at several places in Massachusetts for a number of years. At the beginning of his stud career, so far as public announcements show, True Briton was simply a stallion, "to fame unknown," but later in life, he was represented as an English horse, or what would not be termed a thoroughbred, and finally he had a story tacked on to him in which it was set forth with great particularity that prior to the Revolution, he was one of Colonel DeLancey's race horses, and was stolen from him during the war, ridden into the American lines at White Plains, New York, and ultimately sold by one Smith to Joseph

Ward of Hartford, Conn., and he in turn sold him to Selah Horton, who lived on the other side of the Connecticut River in East Hartford. He was the owner of the horse when Justin Morgan stood him at West Springfield.

In 1788, Justin Morgan, possibly on account of his health, sold his home in West Springfield for thirty-three pounds, seven shillings and sixpence and removed to Randolph, Vermont, with his wife and daughter Emily, born in 1784, and son Justin, born in 1786. After his departure, John Morgan, a distant relative, secured True Briton and stood him during the seasons of 1788 and 1789. He removed to Lima, New York, his departure from West Springfield dating from 1790, and he never returned.

While travelling about Vermont teaching, Justin Morgan saw that there was an opportunity to make a little money with a good stock horse, so he communicated with some one in Hartford, possibly Selah Horton, the owner of True Briton, and procured a horse named Figure which he advertised for service in the Windsor, Vermont, *Journal* in 1793 as the "famous horse Figure, from Hartford". Justin Morgan also stood Figure in 1794, and in 1795, he again advised his patrons by an advertisement in the Rutland *Herald* that "Figure sprang from a curious horse owned by Colonel DeLancey of New York" and by that announcement an effort has been made to show that Figure was the horse afterwards known as Justin Morgan and that Justin Morgan bred him while he lived in West Springfield, notwithstanding the fact that Linsley and others, including Justin Morgan's son, fixed the date of this horse's birth at 1793, beyond a shadow of doubt.

But three years of life remained for Justin Morgan. As yet he had done nothing to carry his name beyond the boundaries of Randolph. He had no home ties and his health bad. In the summer of 1795, after making a season with Figure, he told his friends that he was going down the Connecticut River to Springfield to collect money that was due him, possibly on the house and lot which he had sold in 1788. He rode away and nothing more was heard of him until he returned to Randolph in the early fall, leading a three-year-old gelding and followed by a little nubbin of a two-year-old colt. At a later date, he told his friends that he took the pair in payment of the debt, and that the colt was a Dutch horse. This was the horse that made Vermont famous, and those who today discuss the merits of the family should stop for a moment

to recall that dusty, travel worn figure coming back to Randolph with a three-year-old gelding and a two-year-old colt, neither of which could at that age bring him in any revenue.

For the time being, fame and fortune passed him by, but his home coming in 1795 meant much to Vermont as he was followed by a horse that made the Green Mountain State and those bordering on it, the headquarters of a famous type of horses, and now, after a lapse of over a century, would not the citizens of Vermont be honoring themselves if they erected in Randolph or some appropriate place, a monument in memory of this man and his horse? As for the horse, no one knows who bred him and the only suggestion that can be made is that it was the man who was in Justin Morgan's debt. That man, in all probability, was Abner Morgan. No one has ever taken the trouble to learn who he was, what he did for a living, what he owned, or what became of him. He is the missing link in the story of the horse Justin Morgan.

The only statement in existence in regard to this horse from anyone who knew Justin Morgan appeared in a letter written by his son to the Albany *Cultivator* in 1842. It was also the first statement, and at the time it was written he was not guided by the memories or suggestions of others. He said the colt was a two-year-old when his father brought him to Randolph in 1795, and that his father called him a Dutch horse. That is all. The writer of this letter was twelve years old when his father died, and the only accurate knowledge in connection with the origin of the horse Justin Morgan begins and ends with it. At a later date, John Morgan, still living at that date at Lima, New York, introduced the True Briton story and ultimately supplied Justin Morgan with a dam, while the facts are that John Morgan never saw the man Justin Morgan after he left West Springfield in 1788, and it is self evident that he never had any correspondence with him in regard to this horse or he would have mentioned it when he wrote the Albany *Cultivator*. Half a century later, John H. Wallace loomed up with his iconoclastic hammer and knocked every peg from under the True Briton end of the pedigree by showing that the horse did not stand for service at West Springfield the year Justin Morgan was got, even if he was bred there, which is a point that has never been determined.

But before going any further with the Morgan family, it might be well to stop and look up the Dutch horse. It was intro-

duced in America by the founders of New Amsterdam, the New York of today. Some of them were brought from Holland as early as 1625. By 1650 they were very numerous and used for all kinds of work.

In 1665, after New Amsterdam was surrendered by the Dutch to the English, Governor Nicholls established a race course at Hempstead Plains on Long Island, and offered prizes for races. These events were no doubt contested under saddle as there were no vehicles suitable for harness races in existence then. It was probably the former as the racing was continued for many years and trotting under saddle did not come into vogue on Long Island until early in the nineteenth century, when the descendants of Imported Messenger began to appear on the road in New York, New Jersey and Pennsylvania.

It will therefore be seen that racing was established among the Dutch in New York before the English race horse was considered a separate breed, in fact, it was only being started under the patronage of Charles II, who, after the Restoration in 1660, revived all kinds of sports in England, and especially horse racing. He also kept a number of running horses and frequently rode them in their races at Newmarket. It is therefore safe to presume that the horses which raced on Hempstead Plains in 1665 and for many subsequent years, were Dutch horses, tracing direct to those which were imported from Holland. Dutch horses were also sent to other ports than New Amsterdam, as there has been found at Salem, Mass., an entry in 1635, setting forth the fact that in that year two Dutch sloops landed twenty-seven mares and three stallions. The mares were valued at thirty-four pounds, while the English horse of that period cost six pounds, and ten for freight. The difference in value can in all probability be attributed to the size of the English horse, between thirteen and fourteen hands, while the Dutch horses were between fourteen and fifteen hands, and by the date of the Revolution, this had been increased so that the average horse was fifteen hands.

Dutch horses were plentiful in New York State and especially in the valley of the Hudson River, where the wealthy burghers had large estates and that they were also bred in New England is evidenced by the fact that one of them named Young Bulrock stood for service at Springfield, Mass., in 1792, the year that Justin Morgan was got. He was described in an advertisement as a "horse

of Dutch breed, of large size and a bright bay color". Was this the sire of Justin Morgan? Certainly there are better grounds for claiming it than that he was by True Briton, a horse that is not known to have been there that year, and which was advertised in the *Connecticut Courant* to stand in East Hartford, Conn., although the announcement was afterwards withdrawn.

At this point, it would also be well to stop and compare the gait, form and style of the Dutch horse, with Linsley's description of Justin Morgan, which is as follows:

"The original, or Justin Morgan, was about fourteen hands high, and weighed about nine hundred and fifty pounds. His color was dark bay with black legs, mane and tail. He had no white hairs on him. His mane and tail were coarse and heavy, but not so massive as has been sometimes described; the hair of both was straight, and not inclined to curl. His head was good, not extremely small, but lean and bony, the face straight, forehead broad, ears small and very fine, but set rather wide apart. His eyes were medium size, very dark and prominent, with a spirited but pleasant expression, and showed no white round the edge of the lid. His nostrils were very large, the muzzle small, and the lips close and firm. His back and legs were perhaps his most noticeable points. The former was very short; the shoulder blades and hip being very long and oblique and the loins exceedingly broad and muscular. His body was rather long, round and deep, close ribbed up, chest deep and wide, with the breast bone projecting a good deal in front. His legs were short, close jointed, thin, but very wide, hard and free from meat, with muscles that were remarkably large for a horse of this size, and this superabundance of muscle exhibited itself at every step. His hair was short, and at almost all seasons soft and glossy. He had a little long hair about the fetlocks and for two or three inches above the fetlocks on the back side of the legs; the rest of the limbs were entirely free from it. His feet were small but well shaped, and he was in every respect perfectly sound and free from any sort of blemish. He was a very fast walker."

When the above and the accepted picture of the horse is compared with the type of English thoroughbred of that period, they will be found as far apart as it is possible to be among horses of about the same weight. On the other hand, an English writer describes the Dutch Hartdraver, that is, a fast trotter, as follows:

"These horses run from fourteen to sixteen hands; the head

small, the shoulders well laid back; the haunches prominent, the croup short and broad, and the limbs muscular and clean, but often fringed with longish hair up the sinew above pastern joints." This is taken from a book that was published in London in 1845 and would almost fit the Morgan of today.

Also, in order to show that the trotting speed of the Dutch horse is not of the mythical kind that was attributed to the Narragansett pacer, it is only necessary to refer to the history of the Orloff trotter. This breed was originated by Count Alexis Orloff. He began with an Arabian horse named Smetanka which he bred to a Danish mare. She produced Bolkan. He was larger than his sire and was in turn bred to a Dutch mare which breed at that time had a reputation for its trotting qualities. This Dutch mare, in 1784, nine years before Justin Morgan was foaled, produced Barss, to whom all of the Orloff trotters trace, and there are now over 18,000 of them with records of 2:30 or better, through his sons Dobry, Lebed, and Lubezny.

In Russia, the Dutch mare gave the Orloff horse the trotting step. Did young Bulrock do the same thing in America for the Morgans? He came from a family that was noted for that quality and the results in Russia show that he had the power to transmit it. True Briton, if any of the stories told about him can be believed, came from a family noted for its running qualities, and the ability to transmit it and the turf test in America, proves conclusively that thoroughbred sires have never succeeded in siring trotters in either the first, second or any other generation, except in the line through Messenger, to which all of the Hambletonians and Mambrinos trace.

There is, therefore, nothing left but to add that Justin Morgan, so far as an established pedigree is concerned, is a "Topsy". He simply grew. That he had a sire and dam, we must admit, but their breeding, if they had any of merit, is unknown. The name of his breeder is unknown, and the chances are that it always will be. The only clue is supplied by Justin Morgan's son, who, as before stated, said that his father called the colt a Dutch horse. It is the only testimony that should be accepted. It was the first impression on the subject placed on the memory of a boy and all of us know that they are lasting. It is also unfortunate that Linsley and other early writers on the Morgan horse did not look up the Dutch horse. The fact that Linsley ignored it entirely shows that he never gave it a thought.

SERUM OR INULA AND ECHINACEA IN THE TREATMENT OF CANINE DISTEMPER*

A. SLAWSON, New York City

The purpose of this paper is to discuss briefly the relative merits of two kinds of biologics used in the treatment of canine distemper. A few similar products will be mentioned to bring out more clearly the meaning of what I am endeavoring to place before you. The etiology and symptomatology of canine distemper are so well known that no attention will be given them in this article. It is my aim rather to deal with two points only, viz., the method of treatment and the action of the therapeutic agents in question which in this case are anti-canine distemper serum and inula and echinacea, also to compare these with similar biologics.

METHOD OF TREATMENT. Anti-canine distemper serum is injected subcutaneously, three injections of 4 to 7 c.c. being the rule. This article referring to canines only. It may be stated that subcutaneous injections of this serum cause little pain, no edema and no lameness. This is also true of normal serum, leucocyte extract or nuclein.

Inula and echinacea, a proprietary compound composed of echinacea augustifolia and inula helenium, is injected intramuscularly, six injections of from 2 to 5 c.c. being the usual number. This injection causes considerable pain, lameness for a day or two, and often a transitory cellulitis or serous infiltration with its consequent pain and swelling at the point of the injected material.

Viewing the method of injection of these substances from the standpoint of the comfort of the patient and the impression on its owner, not forgetting the satisfaction we derive as a profession in being able to administer our treatment humanely, the balance in favor of either a subcutaneous or intramuscular injection inclines strongly toward the subcutaneous method.

ACTION OF THERAPEUTIC AGENT. Anti-canine distemper serum acts as an anti-toxin and sets free in the system specific anti-bodies. These act quickly upon *B. bronchisepticus*, especially in the early stages of the disease, besides increasing the leucocytosis already present, thus giving the serum additional bactericidal power.

*Presented at the April, 1918, meeting of the New York City Veterinary Medical Society.

Inula and echinacea causes leucocytosis with a rise in opsonic index but with no specific action upon *B. bronchisepticus*. Plain serum, leucocyte extract, and nuclein possess similar properties to inula and echinacea, the two former products being of animal, the latter of plant origin.

Inula and echinacea has been spoken of as a curative agent in distemper but in cases treated by me it has been necessary to resort to anti-canine distemper serum to effect a final cure. I have found the action of inula and echinacea in repeated injections no different from the action of nuclein, leucocyte extract or plain serum, all of which I used before the advent of the specific serum. I have had three cases treated repeatedly with inula and echinacea by others, and pronounced cured, which two weeks later were brought to me for further treatment. To me the inula and echinacea treatment in dogs is not satisfactory because it is given via the intramuscular route, and because it is not specific.

It is not my desire to go more deeply into the serum treatment of canine distemper because this was gone into fully in my paper on this subject entitled "Serum Treatment of Canine Distemper" read at Kansas City last summer. This paper was published in the JOURNAL OF THE A. V. M. A. in the July, 1918, number.

CLINICAL AND CASE REPORTS

TREATMENT OF SUPPURATING CORNS IN HORSES, WITH A CASE

R. W. SHUFELDT, M.D.
Major, Medical Corps, U. S. A. Army Medical Museum.

The patient here referred to and described is a gray gelding, about ten years of age, that was treated at the veterinary hospital of Dr. Harry Bosley of Washington, D. C. Mr. Roy Reeve, Photographer of the Army Medical Museum of the Surgeon General's Office, made the two photographs, from which the cuts illustrating the article were made—the former having been taken direct from the patient, and each shows the conditions described below. It will be noted that the disease is in the right fore-foot (Fig. 1), and it resulted from the animal having worked on the asphalt streets

of Washington for a period extending over four years. Both the whole of the sole of the hoof and the wall from heel to quarter have been removed.

This condition is quite common, as we would naturally suppose, for the reason that it arises from the horse having been used on cobbled or asphalted streets for too long a time; or, as sometimes happens, from having been quartered in stalls with concreted floors, or other material of an equally hard nature.

Shoes that have remained on too long will also give rise to these suppurating corns, for the heel of the shoe becomes imbedded

FIGURE 1—Gray gelding about ten years old exhibiting a suppurating corn on sole of right fore-foot.

in the sole of the hoof at its heel, and this, in time, causes sufficient irritation to start the inflammation at the point of greatest pressure.

Flat-footed horses are more subject to this disease than those with more shapely hoofs, and this is especially true should the victims be heavily built animals. Generally, the corn makes its appearance on the inside of the hoof of a fore-foot, while the one in the present instance is on the outside.

The premonitory symptom consists in a slight lameness, and

this gradually increases from day to day, particularly should the cause of it be persisted in, or kept up. Local fever soon makes its appearance on the hoof-wall where the corn or suppuration will eventually appear. Should one tap on the hoof at this point the patient will flinch and exhibit other evidences of local tenderness accompanied with pain.

We should now promptly remove the shoe and pare away the sole of the hoof at the heel, and this when skilfully done will soon

FIGURE 2—The same animal showing feet with whole of sole removed and the disease shown in Figure 1 cured. Dr. Harry Bosley, operator, Washington, D.C.

expose the cause of the trouble. First, a red spot or area is exposed, and by continued paring the center will be arrived at, and we may look for the escape of a small quantity of pus. This is all due to the usual tissue and capillary changes that take place at the seat of an acute, or later, a chronic inflammation. Eventually, this

inflammation will extend up the hoof wall and the discharges make their appearance at the coronary band. At this stage, the horse is quite unable to walk, or even put the foot to the ground, and evidently is at no time free from more or less severe pain.

Doctor Bosley, who kindly furnished the notes for this case, informs me that the condition here described lasted about a fortnight, that is, prior to the taking of the photographs—while at the stage shown in the pictures the animal was regaining the flesh that it had lost, and was improving in other respects. As resolution became established, both pain and suppuration subsided, flesh and appetite were regained, and the case gradually passed into recovery.

At the time the photographs were made, here reproduced in Figures 1 and 2, this horse had a slight limp, and it will be fully seven or eight months before the hoof will assume, through growth, its normal size and appearance again.

This growth is already inaugurated as will be noted by observing in the figure the ridge at the coronary band. It is more extensive than the original, for an effort is being made on the part of the new hoof tissue to accommodate itself to the enlarged and changed conditions.

TREATMENT. Doctor Bosley informs me that he has treated many of these cases and is usually successful along the following line, which can also be used in the case of vicious nail punctures.

First of all, the diseased foot should at once be kept in a tub of cold antiseptic solution—night and day—until the acute inflammation subsides or entirely disappears. Usually this is done in a soak stall, using a small tub, and changing the solution frequently. As soon as indications are favorable the hoof wall should be punctured in order to release the accumulated pus. This, if satisfactory, should immediately be followed by the removal of all dead hoof tissues in the diseased parts of the sole and hoof wall, which procedure should promptly relieve the pressure.

When pain and sloughing have both sufficiently subsided, the new hoof growth should be stimulated by the use of mild applications at the coronary band, in the hair above it. In connection with this, mild antiseptic astringents may be applied to the exposed soft tissues, to promote healing and to maintain their healthy state.

The animal here shown passed on to complete recovery under

this mode of treatment, and I am informed by Doctor Bosley that horses, even in these days, are only too often shot when suffering from this condition, the malady being considered incurable by most veterinarians, whereas many animals might be entirely cured were the above treatment carefully followed.

SOME FACTS ABOUT THE TUBERCULIN TEST*

WALTER M. PENDERGAST, Syracuse, N. Y.

In this paper I am not going to give you a history of the tuberculin test as that part is familiar to most of us, but to give you a few of the experiences which I have met with in tuberculin testing. I have had occasion to do considerable tuberculin testing under State supervision and have had many opportunities to perform post mortems on the reactors, thus checking up the results of the tests as to the reliability of the tuberculin test. I will say from my experience that when an animal gives a typical reaction you can be almost absolutely sure that it has tuberculosis in some form. In the past four years I have injected 1420 animals with tuberculin. Some of the animals have been testing yearly. Out of these tests we had one hundred twenty reactions or about 8½%. Of these one hundred twenty reactors I have made sixty-seven post mortems, sixty-five of which showed positive lesions of tuberculosis. One of the two not showing lesions gave a very uncertain reaction, she being the only reactor in a herd of over forty animals. I was very doubtful of her being tuberculous before her slaughter. I think oftentimes, when we fail to find a lesion in a typical reactor, that we have overlooked a small lesion in a gland, or other organ, which may easily occur. The past winter I had occasion to perform post mortems on 12 reactors in a herd of eighteen animals. In one animal that had given a low reaction, I had not found any lesion but after the carcass had been split and hung on the hook I discovered a very small infected lymph gland near the brisket that had been incised when the butcher split the carcass and in the center of this gland was a perfect tubercle.

Now as to the unreliability of the test, I will cite the case of a cow tested by me on May 15-16, 1916, and on July 20-21, 1917, and

*Presented at the meeting of the Central New York Veterinary Medical Association, Syracuse, N. Y., June, 1917.

showing no reaction. Previous to May, 1916, I had tested this cow twice with no reaction, but have not a record of those two tests. This cow was originally in a very badly infected herd about 70% tubercular. This cow was always in fine physical condition until the early fall of 1917 when she injured one of her hind feet. This injury developed into a fistula of the heel and was about three months in healing. She, being very lame, lost a great deal of flesh but we did not suspect anything at this time. On the annual test of this herd the past winter we found four reacting cows, one heifer, and five young bulls. We had not had a reaction in this large herd for nearly three years and was unable to discover the source of infection.

This cow about this time was observed to be coughing some and in quite poor flesh. I took it upon myself to examine her physically and discovered her lungs to be in bad condition. She being a very valuable cow and about seven months pregnant the owner wished to save the calf if possible.

She was segregated but died about one month later. Post mortem showed a very bad generalized case of tuberculosis of both lungs and pleura. We then discovered that two of the reactors had been in a small pasture with her last fall, the reacting heifer had been in an adjoining box stall for about a month, and the five reacting bulls had been watered in the same pail that she drank from. This evidence cleared up the source of infection. On her test of May 16, 1916, you will notice that she gave a temperature of 102 at 6 p. m. and it is possible if the test had been carried further that she might have shown a reaction. Below are her two tests:

JULY 20-21, 1917

9 a.m.	2 p.m.	4 p.m.	12 a.m.	2 a.m.	4 a.m.	6 a.m.	8 a.m.	10 a.m.	12 m.
100.8	101.7	101.8	101.3	101.3	101.5	101.3	101.6	101.3	101.7

MAY 15-16, 1916

11 a.m.	4 p.m.	10 p.m.	6 a.m.	8 a.m.	10 a.m.	12 m.	2 p.m.	4 p.m.	6 p.m.
101.1	101.3	101.9	101.1	100.9	101.6	100.9	101.3	101.8	102.

Here is a case of a cow 13 years old that passed the test Jan. 18-19, 1918. She was in a herd of ten animals, five of which reacted, two being generalized on post mortem.

Retested, this cow May 13-14, 1918, injecting 7 c.c. tuberculin. She gave a typical reaction, and at post mortem showed two calcified lesions in one lung that seemed to me to be of quite long standing. I think the extra 2 c.c. tuberculin caused this cow to react.

We ought to be very careful in regard to passing cows that give suspicious elevations of temperature, especially in herds with a considerable number of positive reactors. Below are temperatures of two reactors. In this herd we had twelve reactors in a herd of eighteen animals.

Age	9 a. m.	11:30 a. m.	3:30 p. m.
2½ yrs.	102.	101.5	101.8
8 yrs.	101.9	102.1	102.6

Age	12 a. m.	2 a. m.	4 a. m.	6 a. m.	8 a. m.	10 a.m.	12 p. m.	2 p. m.
2½ yrs.	101.8	102.	102.	103.1	103.7	103.4	102.	102.6
8 yrs.	101.3	101.9	101.9	102.7	103.3	102.9	103.2	102.6

These two animals proved tubercular on post mortem, but lesions were slight. Many cows have been passed as free from tuberculosis on just such temperatures as these and it behooves us to be more careful.

In regard to testing pregnant animals that are very near parturition, it has been my experience that if an animal is free from tuberculosis, the tuberculin does not have any effect on the animal, although I do not advise testing an animal with a high preliminary temperature.

Below is the temperature of a cow due to calf four days from date of test:

	March 2, 1917		
Age	1 p. m.	3 p. m.	8 p. m.
6½ yrs.	103.2	102.2	103.

	March 3, 1917						
Age	4 a. m.	6 a. m.	8 a. m.	10 a. m.	12 m.	2 p. m.	4 p. m.
6½ yrs.	102.7	103.	104.4	104.2	104.8	103.4	103.6

The owner insisted on testing her as she was consigned to a sale. Under the circumstances I marked her suspicious and held her for retest. About two months later owner called me up and told me this cow had suffered from tympany several times and wanted advise in the matter. I advised him to have her slaughtered as I suspected enlarged tubercular glands between lungs. Held post mortem on her on May 23, 1917, and found an enlarged mediastinal gland about seven inches in diameter. This enlarged gland pressing on the oesophagus caused her to bloat.

In regard to the examination of the lymph glands on post mortem, I wish to call attention to the prescapular lymph gland in front of the shoulder. I remember one reactor in which the only lesion was located in one of the prescapular lymph glands. These glands are not very often infected, but should be always examined for lesions may be found there.

In conclusion I would urge the need of more careful observation during tuberculin tests. Be sure and give dosage enough, especially in old animals. Also be careful in passing animals that give low suspicious temperatures. I consider the physical examination very important, especially in herds that show a considerable number of reactors. Mistakes will occur in tuberculin testing, even when the greatest care is taken, but that is all the more reason why we should be as thorough as possible in our tuberculin testing.

THE VIOLET RAY IN VETERINARY MEDICINE

W. L. Clark, Seneca Falls, N. Y.

Electricity is a force in nature which scientists have, as yet, been unable to define. Some have said that electricity is life. We know that our bodies are charged with it and in the continuous struggle of the body against disease, electricity is always fighting on the side of health. It always operates toward the normal and against the abnormal and thus supernormal as well as subnormal conditions excite its antagonism. It is the great equilibrator.

Undefinable as is this force, it is unquestionably the most rational and logical therapeutic agent that man has at his command.

One of our quaint humorists has said: "If I were a doctor, I'd treat the patient and fergit the disease." This states the extreme metaphysician's view, but the physicist is also liable to go to extremes by dealing only with inanimate things and ignoring the patient's mental attitude. Electricity is the one remedy that both can use because it treats both the patient and the disease. That electricity by the high frequency violet ray method does invoke favorable mental forces is natural because its application is pleasant to the patient and quick in its manifestations. But that it will accomplish results independent of this is shown by the fact that the long list of its successes in the treatment of many ills and diseases has been established largely by results incidental to a result sought for, as, for instance, in the discovery that it has restored gray hair to its natural color, when it was being applied for another purpose and when no such outcome was anticipated.

Nothing in the science of therapeutics has proven so valuable to the physician and suffering humanity as the development of

high frequency electricity. As this marvelous force is so efficient and convenient and economical I believe more veterinarians will use it in their practice.

The tendency of electricity to restore and maintain the natural equilibrium has long been understood, but to apply the treatment in an agreeable form and without injurious effects has been the problem, but it has now been solved by the use of the Violet Ray High Frequency Generator. In this we mean the voltage in electricity which means force. Amperage means the volume, and frequency means the vibrations per second.

Scientific research has determined that the body does not require a large volume of electricity to yield up its ills, but a strong force which will seek out and rescue every cell from the ailment with which it is struggling. This must be done in such a way as to prevent pain or muscular contraction. These objects have been perfectly accomplished by the violet ray high frequency generator through the following processes:

1st. Beginning with the ordinary illuminating voltage (110) the generator intensifies it until it mounts into hundreds of thousands while at the same time consuming only about one-quarter of the current required in a 16 candle power lamp. This gives the desired force.

2nd. The amperage (volume) is reduced from one-half to an infinitesimal fraction. This reduces the quantity to the proper degree.

3rd. The frequency is increased from 120 oscillations in alternating current (no oscillations in direct current) to hundreds of thousands per second from either direct or alternating current. This eliminates pain and muscular contraction.

The reason that the sensory nerves do not comprehend the electric current under the high frequency principle is the same that makes it impossible for the eye to see very rapid motion, or the ear to distinguish high sound vibrations.

I will now quote from the work of one of the foremost electro therapeutists in the country the following statements of effects resulting from the application of high frequency currents:

1. Increase of blood supply to the objective point.
2. General increase in ovidation and local nutrition.
3. Increase oxygen in blood.
4. Increase absorption of oxygen.

5. Increase in expulsion of carbon dioxide.
6. Increase secretions.
7. Increase elimination of waste products.
8. Injection of ozone through lungs and tissues.
9. Locally germicidal.
10. Increase in bodily heat without increase in temperature.
11. Soothing or stimulating according to character and length of treatment.
12. Caustic when strong sparks are applied.
13. Arterial tension increased by spinal spark application.
14. Absorption of plastic exudates promoted.

These effects are mainly local, yet apply to a lesser degree to the entire system as the current traverses the whole body. It may be seen from the above what a wide range of uses high frequency has. In fact it still remains for its limits to be established. It may be briefly stated as a cellular massage. The study of high frequency is endless as each day brings new revelations, but simple tests will quickly establish its merits.

Pain can be promptly relieved or greatly alleviated.

The air is quickly purified and the ozone is very perceptible. Water may be purified by a moment's contact. Warts, moles, etc., may be promptly and effectively removed.

It can be stated with assurance that high frequency is absolutely indispensable to the veterinarians, for which no cure-all claims are asserted to excite prejudice. It may be safely declared that this modality is a help-all and cure-much. It may be applied independently or in connection with medicinal dosage because it prepares the body to receive the help which the medicine offers, and it may be applied to force surface applications.

In my general practice I have used it on all animals, large and small, and have had very good success. My first case was that of a dog which was a case of paralysis following distemper. When he entered the hospital he could not use any of his limbs at all. I applied the violet ray after exhausting the pharmacopea and in two weeks had the animal moving all four limbs. Two weeks more showed improvement to such a marked degree that I was very agreeably surprised as now he would sit on his hind limbs like a kangaroo. I used the surface electrode and applied it about fifteen minutes, in all three times daily, then as symptoms improved applied it twice daily until he began to place weight on the front legs, then treated only once daily.

In all the treatment was of eight weeks' duration, until the patient was able to go about. I kept the patient two weeks longer as I wished to see if the results were permanent, which they were, and animal now is in fine condition.

CASE No. 2. Pustulus skin eruptions on arm was treated by surface electrode 15 minutes three times daily and in ten days the patches began to heal and in a month they were all healed. Applications of sannax oil was used then for the restoration of hair.

CASE No. 3. Sow with paresis of hind parts occurring after farrowing. In one week patient was able to walk about and treatment was discontinued. Treatment consisted of surface electrode 3 times daily.

CASE No. 4. Sow with paresis of hind parts same as above. Treatment same. Duration two weeks.

CASES Nos. 5, 6 and 7. Azoturia in horses. Surface electrode 15 minutes' duration, 6 hour intervals. First patient able to stand alone in 24 hours. Second case, patient able to stand alone in 48 hours. Third case, patient showed symptoms in one limb. In 24 hours improvement noticed and in 3 days discharged.

INGUINAL HYSTEROCELE

W. J. CROCKER
Laboratories of Pathology and Bacteriology, University of Pennsylvania, Veterinary School

A five-year-old bull bitch presented a firm swelling the size of a human fist, which had existed for a period of several months in the right posterior mammary gland. The condition was diagnosed as a neoplasm of the mammary gland and the owner sent the animal in to be destroyed. At autopsy the cadaver was placed in the dorsal position, an incision made through the skin from the chin to the pubis and the skin together with the mammary gland separated from the abdominal wall and laid back. Opposite and anterior to the external ring of the right inguinal canal the greater portion of the right horn and round ligament of the uterus and part of the omentum protruded from the canal and flattened, thinned and bulged the mammary gland outward producing an enlargement the size of a fist. When opened the right inguinal canal disclosed the remainder of the right uterine horn together with the mammary vessels and nerves.

The bitch is more predisposed to inguinal hysterocele than the females of other domesticated animals because the round ligament of the uterus of the bitch is well developed (unstriated muscle and fat) and extends from the extremity of the uterine horn through the distinct inguinal canal to the ramus of the os pubis and tends to direct the uterine horn into the canal. In the females of other domesticated animals the internal inguinal ring tends to close at an early age, contains spermatic vessels and nerves but does *not* contain the round ligament of the uterus. On external examination inguinal hysterocele may be confused with tumors of the mammary gland of the bitch.

ABSTRACTS FROM RECENT LITERATURE

MARASMUS OF ARMY HORSES. M. Urbain, Vétérinaire, Infirmary, C.V. Belgian Army. *Revue Generale de Médecin Vétérinaire,* June, 1918.—On our arrival at the Central Veterinary Infirmary of Belgium we were struck with the increasing number of horses evacuated for "marasmus".

The autopsies of these marasmatic horses reveal two worms: a cylicostome and the Strongylus equinus (caecum, colon). These parasites were constant in the cases of marasmus in those of our observations that were followed by autopsies. We frequently noted the co-existence of gastrophilis (stomach), ascaris (duodenum), Anoplocephala mamillana (fecal matter) and the Filaria equina (peritoneal cavity).

This is not the first time that the cylicostome has made its appearance in veterinary pathology. Cuillé, Marotel and Roquet observed them in horses appearing to be in good health, eating ravenously and still growing thinner and thinner until they died of marasmus.

The mucous membranes were pale and the pulse and temperature normal.

In Brazil we contributed largely to the proof that osteomalacia of the horse is due to a cylicostome. (I. *A osteomalacia ou a cara inchada. O. Dia Mai 1914—Contribuicao para o estudo da cara inchada. A. Estancia juillet 1915.*)

With us there is no doubt that horses affected with a state of marasmus should be suspected of having a large number of para-

sites in the intestines. They exert a triply pathogenic action by despoiling the animal through the number of parasites, the irritation of the mucous membrane by their presence or by the traumatisms they produce or by diverting extremely active toxins into the organism as has been shown is the case with other nematodes, especially the Ascaris megalocephala.

It will not be denied that the various intestinal parasites found alone or concurrently in horses occur in all conditions of health or in deaths in no way associated with a state of marasmus. The objection is not without value. However, one must not lose sight of the very great part played, as much with external as internal parasitic diseases, by the soil, while seeming at least equal but otherwise preponderating to that of the parasite itself. In the one of which we speak, advanced age, cold, acclimation, more or less bad alimentation, concomittant diseases such as mange has truthfully exercised this preparing influence on the "soil". Further, we can see no other causes that can explain the chain of symptoms and lesions observed, no fever, persistance of the appetite, deficient nutrition and no infectious lesions.

SYMPTOMATOLOGY. 1. Healthy appearance.

2. Progressive loss of flesh.

3. A voracious appetite: inconstant pica.

4. Absence of fever and febrile symptoms.

The animals eat ravenously all that comes before their teeth, oats, straw manure, and the ingestion of sand may cause recurrent colics and death.

We have often observed the ingestion of non-alimentary material in the diseases causing general malnutrition, such as hookworm of humans, bovine piroplasmosis, equine osteoporosis, canine rickets, etc.

In the last stages of the disease the patient becomes enfeebled to the point of being unable to rise alone after lying down but still continues to eat all it can reach during its decumbency. Placed on its feet the patient is normal again. The mucous membranes are rather pale.

The temperature oscillates between 36° and 38° C. Cases of hypothermia are not rare but hyperthermia is constantly absent. The pulse is normal or sometimes small and the heartbeats are strong as in dilatations. The respirations are normal in rhythm and number.

The feces are quite moist and permeated with grains of oats and coarse forage. Digestion is impaired.

The patients stand sometimes on all four, sometimes on the two fore legs and at other times on the two hind legs.

Microscopic examination of the feces reveals ova of strongyli.

LESIONS. The lesions are those of verminous cachexia. The muscles are emaciated, the connective tissue shows points of serous infiltration, and there is a transudation of sero-fibrinous liquid in the peritoneal, pleural and pericardial cavities. The parenchymatous organs are not "infectious". In the lumen of the intestines (colon and caecum) there are found numerous adult worms and larvae of the cylicostome and strongyle (sclerostome). The intestinal walls are not changed in color except occasionally they may show a slight enteritis. The mucous membrane when ridden of the alimentary matter exhibits small cysts caused by the presence of embryos, which after penetrating the mucous membrane becomes enveloped by the inflammatory reaction of the environs. The cystic cavities end by opening into the intestines where the parasites develop into perfect worms. These facts have already been established in parasitology. Verminous granulations are often seen in the liver and lungs. These are white or yellow, spherical, calcified nodules varying from the size of a millet seed to that of a bean, that is easily enucleated. They are distributed over the serous membranes and in the depth of the organs and are constituted of a central caseocalcareous mass with a fibrous shell. Microscopic examination reveals in the contents a nematode larva that is always altered and sometimes difficult to identify. The heart is dilated.

ETIOLOGY. The best understood cylicostome is the *Cylicostomum tetracanthum*. According to Neveau-Lemaire it is a nematode belonging to the family *Strongylidae* and sub-family *Strongylinae*. The male is 8 to 17 millimeters long and the female 10 to 24 millimeters long. The mouth is encircled by a projecting cuticular fold carrying six papillae. The buccal cavity is armed with a crown of triangular denticles. The caudal pouch has two lateral lobes united by an anterior and a posterior lobe more or less elongated. There are two spiculae curved at each extremity.

We have pointed out the following species: Cylicostomum tetracanthum, labratum, labiatum, coronatum, bicoronatum, poculatum, calicatum, alveatum, catinatum, nassatum, radiatum, elongatum and auriculatum.

According to our observations the ova segment as soon as laid like those of the Strongylus equinus, but they are always longer and thinner. The longitudinal diameter is more than double that of the transverse. The cylicostome lives in the colon and caecum.

We think it is useful to draw the attention of those who seek to find them post mortem, to the difficulty of finding them because of their obscurity. To be sure that they exist the colon and caecum must be well stretched out and incised with a bistoury. The alimentary mass thus exposed is examined closely without disturbing it. Very thin white threads, through the action of cold, are seen to wiggle about in the most liquid parts. These are gathered with the point of the bistoury stretched out on the blade and placed on some container to carry them for the microscopic examination.

The Strongylus equinus or Sclerastomum equinum, better understood than the preceding and being larger is, according to Neveau-Lemaire, a nematode 18 to 35 millimeters (male) and 20 to 55 millimeters (female) long.

The mouth is distended by concentric, chitinous rings, the most external ones of which present six papillae while the internal ones are armed with denticles. The buccal cavity is supported by a single longitudinal dorsal rib and at the bottom is provided with two rounded sharp plaques. The caudal pouch of the male is almost trilobate. The tail of the female is blunt and the vulva is located toward the posterior third of the body. The ovum is ellipsoid and is slightly bulged in the middle. It measures 92 μ long by 52 μ thick.

It should be stated in passing that the agamic strongyli can lodge in the arteries (colic and mesenteric) and produce verminous aneurisms which disengage emboli and cause grave intestinal congestions and fatal colics. It might also be said that strongylosis is seen especially in aged horses. Nearly all of the marasmatic subjects we have seen were aged.

Evolution. Coupling as much with the sclerostome as with the cylicostome occurs in the colon and caecum. The ova already segmented at the time of laying are expelled with the excrement. They develop in water and damp grounds at a temperature of 15 to 20° and after a time varying from two days to twenty days give birth to the embryos which, ingested by a horse, becomes en-

cysted in the mucous membrane of the large intestines where its evolution continues. As horses are infested by the drinking water or by wet pastures it is of great interest to avoid in the future the purchase of horses infested before importation by knowing the regions whence they originated.

DURATION, COURSE AND TERMINATION. Cylicostomo-strongylosis is a chronic disease. It is only after some months (six or seven) that the infested animal shows signs of malnutrition. The patient once well enfeebled lies down and dies from infection of the wounds of decubitus. Sand colics or pica can, however, bring a fatal termination more rapidly.

DIAGNOSIS. The epizootic character of the affection, absence of fever, progressive loss of flesh, and abnormal appetite constitute the principal elements of the diagnosis. The microscope, by revealing the ova of the cylicostomes and of the strongyli, removes all doubt.

PROGNOSIS. The prognosis is unfavorable as cylicostomo-strongylosis is a grave disease. The beginning is so insidious that it passes unperceived and thus does not permit of effectual intervention.

TREATMENT. The treatment is curative and preventive. The curative consists of eliminating the intestinal parasites and of toning up the system. If the expulsion of the worms inhabiting the lumen of the intestines is theoretically easy the destruction of those fixed in the intestinal walls and the encysted larvae presents great difficulties. To expel the worms thymol should be employed (Giles and Theobald), or santonin, calomel, terebinthinae, creolin, or picric acid. As the parasites live in the large intestines it would perhaps be an advantage to inject the vermicide with a trocar and cannula. To attack the encysted larvae intravenous injections of atoxyl or cacodylate of sodium should be tried. The system is toned up with good alimentation (green food), special hygienic care and the administration of such tonics as arrhenal, atoxyl, cacodylate of sodium, etc.

As noticed above, the worms hatch in damp grounds at temperatures of 15 to 20°, there is danger of purchasing animals and forage from infected regions. It should also be desirable that the manure from infected animals is not accumulated near stables nor spread upon pastures. It should be sold for use on tilled land. The manure could be sprinkled with lime water and the contaminated pastures could be treated with sulphur. L. A. MERILLAT.

REACTION PRODUCED BY THE INTRA-PALPEBRAL INJECTION OF MALLEIN. Lanfranchi, A., in *Il Moderno Zooiatro,* Series V, Year VI, No. 9, pp. 197-202, fig. 1. Bologna, September 30, 1917. Abstract in *Internat. Review of the Science and Practice of Agri.*—The diagnosis of glanders by means of the reaction produced by the intrapalpebral injection, proposed by the author in 1914, has been widely used, having been officially adopted for use in the Allied armies. As the author has applied it to a considerable number of cases, he has been able to make many observations, which have led him to the conclusions given below.

If, on account of numerous reactions produced by intra-palpebral injections or for other causes, sclerosis of the conjunctive tissue is observed in the lower eyelids, the mallein should be injected into the upper eyelid.

In the case of a negative intrapalpebral reaction in subjects already tested several times by this method, and for which the period of the last intrapalpebral reaction is unknown, a minimum period of 15 days should be allowed to pass before repeating the injection. If this precaution is not taken, a subject still infected with the living organism may be thought to be free from glanders.

FISH.

COCCIDIOSIS IN YOUNG CALVES. Theobald Smith and H. W. Graybill. *The Journal of Experimental Medicine,* Vol. XXVIII, No. 1, July 1, 1918.—"Discharges of blood per rectum, associated with oocysts of coccidia, were observed occurring in young calves during the warmer season of the year. In a small percentage of cases death was probably due directly to the coccidiosis. Although the disease, known as red dysentery in Switzerland, may have existed in this country for some time, there seems to have been no knowledge of its existence and no reports of it have thus far been published. The coccidia have been artificially cultivated and shown to produce four spores. Two oocysts of quite different dimensions and having minor differential characters were encountered in the same animal in several instances.

The invasion of the epithelium of the small intestine was slight. The chief seat of the parasitism was the large intestine. The lesions following the loss of epithelium were superficial hemorrhages and filling up of the denuded tubules with polymorphonuclear leukocytes."

HAYDEN.

THE INTRA-PALPEBRAL REACTION IN THE DIAGNOSIS OF EPIZOOTIC LYMPHANGITIS. (1). Lanfranchi, A., in *Il Moderno Zooiaro,* Series V, Year VI, No. 10, pp. 217-225, fig. 5. Bologna, Oct. 31, 1917. Abstract in *Internat. Review of the Science and Practice of Agriculture.*—The clinical diagnosis of epizootic lymphangitis, although generally fairly easy, is, however, not always possible, and under practical conditions the microscope is not always available for identifying the characteristic *Rivolta cryptococcus.* For this reason, the writer has sought a sure method for diagnosing this infection, based on the so-called "allergic" local reaction, i. e., on a special state of specific hypersensibility of the affected subjects.

The test materials are prepared in the following manner: to 1 part of pus, collected aseptically and known to be free from other microorganisms 2 parts of ether are added; shake well, then leave to stand for 24 hours; the ether is then evaporated off on the water bath; make up to the original volume with distilled water and leave to stand for 24 hours; then heat at 80° C. on the water bath for 15 to 20 minutes and allow to cool; centrifuge for 20 to 30 minutes at 2000 to 3000 revolutions per minute; decant off the liquid part, which constitutes the vaccine to be used for inoculating in 2.5 to 3 c.c. doses, according to the number of cryptococci used.

The injection into the eyelid is carried out in the usual way.

In healthy animals, or those infected with a disease other than epizootic lymphangitis, the injection gives rise to an edema localized at the points of injection, or which at the most extends to the lower eyelid only. This edema is produced in 1 or 2 hours after inoculation, attains its maximum between the 8th and 9th hours, then being slowly reabsorbed, and disappearing entirely after 20-24 hours. On the other hand, in animals infected with epizootic lymphangitis, the local reaction, which commences 2 to 4 hours after the injection, already extends, between the 4th and 6th hour, over all the lower eyelid, sensibly reducing the palpebral opening; the edema spreads gradually and, after 24 to 49 hours, reaches the lower border of the zygomatic crest, passes it a little in front while progressing backwards towards the lower mandibular arch, which it may even reach. This local reaction lasts several hours, then slowly diminishes up to the 3rd, 4th or 5th day. The purulent conjunctivitis occurs 4 hours after inoculation and increases in 24-48 hours.

One test for the intra-palpebral reaction has no influence on successive tests. The most intense and lasting effects of the reaction are shown by animals in which lesions have already commenced.

The use of this method of diagnosis, combined with treatment by arsivan, which was tested by Favero (*Moderno Zooiatro,* Scientific Part, 1917, No. 6, p. 129), who suggested its use, would, thinks the author, cause the disappearance of the centres of infection from which the disease spreads. FISH.

PRELIMINARY REPORT ON THE VIRULENCE OF CERTAIN BODY ORGANS IN RINDERPEST. W. H. Boynton. *Philippine Journal of Science,* Vol. XIII, Sec. B, No. 3, May, 1918.—The virus of rinderpest attacks primarily the involuntary muscles, the endothelial lining of the capillary vascular system, and the parenchymatous tissue. The virus does not have its source of development in the blood stream. The tissue cells seem to be its real source.

Extracts were prepared from liver, spleen, lymph glands, heart, intestines, thymus, skeletal muscle, larynx, pharynx and back of tongue of animals having been bled for virulent blood or having died after the regular course of rinderpest. Extracts were kept as sterile as possible and for the purpose of the experiment were injected into animals highly susceptible to the disease. In the work it developed that the tissues best adapted to the production of virus were the liver, spleen, lymph glands, heart, fourth stomach, caecum and colon. In a 0.5 per cent phenol extract of liver, spleen, and lymph glands the virus persisted in a virulent form from eight to fifty-five days. The best extract is one in 0.75 phenol and not over 15 days old. It seems to be plausible that similar or even better results may be obtained with the virus of hog cholera along the same lines. HAYDEN.

NOTE ON THE USE OF ORGAN EXTRACTS IN PLACE OF VIRULENT BLOOD IN IMMUNIZATION AND HYPERIMMUNIZATION AGAINST RINDERPEST. W. H. Boynton. *Philippine Journal of Science,* Vol. XIII, Sec. B, No. 3, May, 1918.—The virulent blood and the organ extracts from a Batanes bull furnished 20 liters of virulent material. Since the virulent blood produced was 9000 c.c. the whole amount of virulent material was over twice that produced by the ordinary methods. The amount might have been tripled if the animal had been handled by the "Martoglio" method. Both simultaneous immunization and hyperimmunization were accomplished

with tissue extracts in the provinces and at the laboratory. The extracts were just as potent as virulent blood when used in simultaneous immunization work. Kept at 15° C. 2000 c.c. doses were used with safety for hyperimmunization. Such a dose should not be given after having been exposed for a period of eighteen hours to the climatic conditions of the tropics. The extracts are easily produced and could be used at any immunization station. The method should be applicable to hog cholera, reducing the enormous cost of the virus. HAYDEN.

THE INSUFFICIENCY OF MAIZE AS A SOURCE OF PROTEIN AND ASH FOR GROWING ANIMALS. Hogan, Albert G. (Dept. of Chem., Kas. State Agri. Exp. Station, Manhattan, Kas.) in the *Journal of Biol. Chem.*, Vol. XXIX, No. 3, pp. 485-493, 3 diag., Baltimore, April, 1917. Abstract in *Internat. Rev. of the Science and Practice of Agri.*—Agriculturists have known for a long time that maize kernel does not suffice as a diet for growing animals. Experiments on young rats have shown the first limiting factor for growth to be a lack of certain inorganic constituents. When the mineral deficiencies were corrected, normal growth was not obtained, even after the addition of considerable quantities of purified protein, thus proving a lack of suitable growth accessories. According to McCollum, and his collaborators, maize kernel is lacking an accessory called by them "fat-soluble A". The author's previous experiments show that mineral deficiencies in maize are tolerated much better by swine, and protein deficiencies are tolerated better by rats. Assuming that maize is poor in one or more of the growth accessories, swine are much less affected by it than are rats.

The author has continued his earlier work in order to determine specifically what inorganic elements in the ash, and what amino-acids in the proteins are deficient in quantity, thus constituting limiting factors. It was first shown that the addition of tryptophane and lysin improved the proteins of maize, and later, that tryptophane is the first limiting factor in the proteins of the maize kernel, and that lysine is the second. The most important mineral deficiency of maize is calcium. FISH.

WHITE SNAKEROOT OR RICHWEED (EUPATORIUM URTICAEFOLIUM) AS A STOCK-POISONING PLANT. C. Dwight Marsh and A. B. Clawson. *United States Department of Agriculture, Bureau of*

Animal Industry, Circular 26, Feb. 28, 1918.—White Snakeroot is among the suggested causes of the disease milk sickness, trembles, slous, tires, etc. Whether or not it is the cause of the disease its importance as a stock-poisoning plant has received little recognition. Trembling is one of the most noticeable symptoms of its poisonous nature. Marked depression and inactivity may be the first symptom noticed. Constipation is the rule and sometimes the feces are bloody. Nausea and vomiting are not uncommon. Respiration is normal except on exertion when it may become labored and quickened. On the average there is no significant change in temperature. Weakness is very pronounced. Animals may live several days after the first symptoms. Symptoms in general are typical of milk sickness. No animals seem to be immune to the toxic principle of the plant.

There seems to be very little difference between toxic and lethal doses. The toxic substance is eliminated slowly and thus there is a distinct cumulative effect. The plant is most poisonous in a fresh state. Poisoning is produced by a poisonous principle in the plant.

Most cases of so-called milk sickness occur in localities where the plant grows. Many if not most cases of the disease are caused by the plant. Some cases may be bacterial in origin. Trembling seems to be characteristic of eupatorium poisoning while a subnormal temperature is distinctive of the bacterial disease.

Most cases of poisoning by the plant occur when there is a shortage of other foods. Purgatives, such as epsom salts and laxative foods are well indicated. Since the toxic substance is eliminated slowly recovery is slow and rather prolonged attention should be given the animal. Clearing the land will act as a preventive measure. Animals should not graze where eupatorium is abundant. Losses should be avoided by prevention rather than by reliance on remedies. HAYDEN.

—Dr. Wm. C. Woodward has resigned as Health Officer of the District of Columbia and is now Commissioner of Health, Boston, Mass. Dr. Wm. C. Fowler has succeeded him in Washington.

—Dr. R. H. Fessler has removed from Elmhurst, Long Island, to 225 N. High Street, Harrisonburg, Va.

ARMY VETERINARY SERVICE

INFORMATION RELATING TO APPOINTMENTS IN THE VETERINARY RESERVE CORPS OF THE ARMY

Examinations for commission in the veterinary section of the Officers' Reserve Corps are open for veterinarians in civil life. All appointments will be in the grade of second lieutenant and future promotions based entirely on the qualifications of the officer.

The officers of the Veterinary Reserve Corps are appointed and commissioned by the President, after having been found upon examination prescribed by him, physically, mentally and morally qualified to hold such commissions. Commissions are issued for periods of five years, at the end of which time the officers may be recommissioned subject to such further examinations and qualifications as the President may prescribe. They are subject to call for duty in time of actual or threatened hostilities only. While on active duty under such call they are entitled to the pay and allowances (including quarters, fuel and light) of their grade. They are entitled also to pension for disability incurred in the line of duty and while in active service. They are not entitled to pay or allowances except when in active service, nor to retirement or retired pay.

Appointees must be citizens of the United States, between 22 and 55 years of age, must be graduates of recognized veterinary colleges or universities, and must at the time of appointment be in the active practice of their profession in the States in which they reside.

The examination is physical and professional. It is conducted by boards consisting in each case of one medical and two veterinary officers of the army, designated by the War Department.

The examination as to physical qualifications conforms to the standard required of recruits for the United States Army. Defects of vision resulting from errors of refraction which are not excessive, and which may be entirely corrected by glasses, do not disqualify unless they are due to or are accompanied by organic disease. Minor physical deficiencies may be waived.

The professional examination may be oral. If the applicant fails therein, he may if he desires have a written examination. An average of 75 per cent is required to qualify in the examination. The examination comprises the following subjects:

1. General anatomy.
2. General pathology, therapeutics and surgery.
3. General bacteriology and parasitology.
4. Hygiene, including feeding and watering, stabling, heat and light, and ventilation.

Applications for appointment in the Veterinary Reserve Corps must be made in writing, upon the prescribed blank form, to the Surgeon General of the Army, Washington, D. C., who will supply the blank upon request. This blank may also be obtained from the examining board. The correctness of the statements made in the application must be sworn to by the applicant before a notary public or other official authorized by law to administer oaths. It must be accompanied by testimonials based upon personal acquaintance, from at least two reputable persons, as to the applicant's citizenship, character, and habits, and by his personal history given in full upon the blank form furnished him for the purpose.

A veterinary examining board has been appointed at the following places:

ALABAMA

Anniston, The Camp Veterinarian, Camp McClellan.

ARKANSAS

Little Rock, The Camp Veterinarian, Camp Pike.

CALIFORNIA

Linda Vista, The Veterinarian, Aux. Remount Depot, Camp Kearney.

San Francisco, The Veterinarian, The Presidio of.

DISTRICT OF COLUMBIA

Major Joseph N. Hornbaker, V.C.N.A., S.G.O., Unit F, 7th and B Streets, N. W.

FLORIDA

Jacksonville, The Veterinarian, Aux. Remount Depot, Camp Joseph E. Johnston.

GEORGIA

Atlanta, The Veterinarian, Aux. Remount Depot, Camp Gordon.

Chickamaugua Park, The Senior Veterinary Instructor, Medical Officers' Training Camp, Camp Greenleaf.

ILLINOIS

Chicago, Major Geo. A. Lytle, V. C., N. A., 3615 Iron Street.

IOWA

Des Moines, The Veterinarian, Aux. Remount Depot, Camp Dodge.

KANSAS

Fort Leavenworth, The Post Veterinarian.

Fort Riley, The Senior Veterinary Instructor, Mounted Service School.

KENTUCKY

Louisville, The Camp Veterinarian, Camp Zachary Taylor.

LOUISIANA

Alexandria, The Veterinarian, Aux. Remount Depot, Camp Beauregard.

MASSACHUSETTS

Ayer, The Veterinarian, Aux. Remount Depot, Camp Devens.

MICHIGAN

Battle Creek, The Veterinarian, Aux. Remount Depot, Camp Custer.

MINNESOTA

Fort Snelling, The Post Veterinarian.

MISSOURI

St. Louis, Major C. W. Greenlee, V. C., N. A., Medical Supply Depot.

MONTANA

Fort Keogh, The Purchasing Zone Veterinarian.

NEW MEXICO

Deming, The Veterinarian, Aux. Remount Depot, Camp Cody.

NEW YORK

Fort Jay, The Veterinarian.

OHIO

Chillicothe, The Veterinarian, Aux. Remount Depot, Camp Sherman.

OKLAHOMA

Fort Sill, The Veterinarian.

PENNSYLVANIA

Philadelphia, Major Samuel H. Gilliland, V. C., N. A., Veterinary Laboratory, 39th and Woodland Avenue.

SOUTH CAROLINA

Columbia, The Veterinarian, Aux. Remount Depot, Camp Jackson.

TEXAS

Fort Worth, The Veterinarian, Aux. Remount Depot, Camp Bowie.

Houston, The Veterinarian, Aux. Remount Depot, Camp Logan.

Fort Sam Houston, The Veterinarian, Aux. Remount Depot, Camp Travis.

VIRGINIA

Newport News, The Supervising Veterinarian, Port of Embarkation.

Petersburg, The Senior Veterinary Instructor, Veterinary Training School, Camp Lee.

WASHINGTON

American Lake, The Veterinarian, Aux. Remount Depot, Camp Lewis.

WYOMING

Fort D. A. Russell, The Veterinarian.

The applicant should proceed to the most accessible point in the foregoing list and report to the board. He will be required to defray all travel or other expenses incurred in going to the point of examination, while there, and in returning to his home.

The applicant should take with him to be submitted to the board (a) the application blank, completely filled out and sworn to before a notary public, (b) testimonials based upon personal acquaintance from at least two reputable persons and (c) a certificate from the proper official that the applicant is duly registered to practice veterinary medicine in the State in which he resides. The application (a) can be filled out after arrival at the place of examination but time will be saved if it is prepared at home beforehand.

Successful applicants who are commissioned in the Veterinary Reserve Corps are placed on a waiting list and called to active duty as their services may be required. No assurance can be given any person as to when he may be called, but the present chances for active duty at an early date are good. Officers receiving commissions should, therefore, continue their civil occupations until such time as they receive instructions from the War Department.

—Major H. E. Bemis of Ames, Iowa, is now with the American Expeditionary Forces in France.

—Major John H. Gould, Captain Joseph F. Derivan, Lieut. Geo. W. Moon, Lieut. Lester L. Jones, Lieut. Roy H. Tesdell, Lieut. Jean R. Underwood, Lieut. Spencer K. Nelson, Lieut. Guy M. Parrish, Lieut. Orrin H. Crossland, Lieut. Ralph A. Parsons and Lieut. James B. McNamara, who have been stationed at Camp Dodge, Des Moines, Iowa, have all been transferred to the 88th

Division and are with the American Expeditionary Forces, overseas.

—Major John H. Gould and Captain Joseph F. Derivan spent a few days at Camp Upton, L. I., and Hoboken, N. J., on their way overseas.

—Capt. Lawrence A. Mosher, V. C., N. A., was married to Miss Arlye Fuller of Hillsdale, Mich., at the First Episcopal Church, Jersey City, N. J., July 31, 1918. Capt. Russell E. Elson, V. C., N. A., Camp Upton, L. I., attended him as best man.

—Captain Ross A. Greenwood, V. C., N. A., has been transferred from Hdqs. Army Artillery to Hdqs. 77th Division, American Expeditionary Forces, as Division Veterinarian.

—Captain Jos. F. Crosby, formerly at Fort Sill, Okla., is now Camp Veterinarian at Camp Dodge, Des Moines, Iowa.

—2nd Lieut. Harrold L. Campbell, V. R. C., reported for duty with Depot Brigade No. 152, Camp Upton, L. I., Aug. 9. Lieut. Campbell has been at the Veterinary Officers' Training School at Camp Greenleaf, Ga.

—2nd Lieut. Spencer K. Nelson, V. C., U. S. A., received his promotion to 1st Lieutenant August 3, 1918.

—Lieut. R. O. Stott has been transferred from the 12th Cavalry, Columbus, N. M., to the Remount Depot, Fort Bliss, Texas.

—Dr. R. S. Whitney of Jersey City, N. J., has entered the service and is stationed at Camp Sevier, Greenville, S. C.

—Dr. H. P. Bonnikson, formerly of Berkeley, Calif., is now in the service as Lieutenant in the Veterinary Reserve Corps. He is located at 4130 Drexel Blvd., Chicago, Ill.

—Dr. M. V. Wilmot has transferred from Fort Riley, Kas., to Veterinary Reserve Corps No. 1, Camp Greenleaf, Chickamauga Park, Ga.

—Lieut. J. G. Nash, who has been stationed at Fort Riley, Kas., is now with the American Expeditionary Forces, overseas.

—Dr. Chas. M. Stull, formerly Lieutenant with the 1st Cavalry, Douglas, Ariz., has been promoted to a Captaincy and is now Camp Veterinarian at Camp Bowie, Fort Worth, Texas.

—Lieut. S. C. Dildine has been transferred from Louisville, Ky., to 557 N. 13th Street, St. Louis, Mo.

—Lieut. L. J. Anderson, who has been located with the 115th Field Signal Battalion at Camp Kearney, is now with that Battalion with the American Expeditionary Forces, overseas.

—Dr. Ray Gaskill, formerly at the Remount Depot at Camp Kearney, Calif., is now a Lieutenant in the Veterinary Corps, National Army, and is stationed at Kelly Field, San Antonio, Texas.

—Dr. Simeon Yetter of Far Rockaway, N. J., is now a Lieutenant in the Army Veterinary Service and is stationed at Camp McClellan, Ala.

—Lieut. Samuel M. Langford has been transferred from Camp Sevier, S. C., to the 14th F. A., Fort Sill, Okla.

—Lieut. John J. Martien, Camp Funston, Kas., is now with the American Expeditionary Forces, overseas.

—Dr. Walter G. White of Lansdowne, Pa., is now a 1st Lieutenant with Major McKillip's Veterinary Hospital, No. 6, Somewhere in France.

—Dr. H. M. Cameron, who has been stationed with the 24th Engineers, Newport News, Va., is now with the American Expeditionary Forces.

—Dr. N. L. Nelson of the 55th Field Artillery Brigade, formerly at Camp Sevier, S. C., is now with the American Expeditionary Forces.

—Dr. G. W. Rawson of Norfolk, Va., is now a Lieutenant in the Veterinary Officers' Reserve Corps stationed at Camp Wadsworth, Spartanburg, S. C.

—Lieut. John J. Handley, formerly at Camp Hill, Va., is now with the First Division, American Expeditionary Forces, France.

—Dr. M. L. Walter of Napoleonville, La., is now in the service as Lieutenant with the 7th Battalion, Camp Greenleaf, Ga.

—Dr. W. E. Simonson, Cherokee, Iowa; Dr. Roy E. Onderkirk, Reynolds, Ill.; Dr. W. M. Lynn, Pittsburgh, Pa.; Dr. Will D. James, Martinsville, Ill., and Dr. D. E. Reece, Rossville, Ill., have entered the Medical Officers' Training Camp at Camp Greenleaf, Chickamauga Park, Ga.

—Dr. R. C. Dunn has removed from College Station, Texas, to 263 West Market Street, Tiffin, Ohio.

—Dr. A. Berdan has removed from Miles City to Great Falls, Montana.

AMERICAN VETERINARY MEDICAL ASSOCIATION

PRESIDENT'S ADDRESS

F. TORRANCE, Ottawa, Can.

It has been customary, on occasions of this kind, for your president to indulge in some remarks, laudatory of the veterinary profession, and also at times to criticize its short comings, and frequently to give it the benefit of his advice. These are tasks for which I am but little fitted by ability or inclination, and I must ask your indulgence for a few remarks of a more or less rambling nature.

First, I would say a word as to the war, and on our part in it as a profession. Both American and Canadian veterinarians take a just pride in the prompt alacrity with which the profession responded to the call to arms. The veterinary corps of our countries were rapidly recruited, not merely with the young and inexperienced, desirous of the excitement and change of army life, but with many of the best men in the profession, men who gave up important positions in our colleges, responsible posts in the Government service, and sacrificed lucrative practices to serve their country. We honor them for what they are doing, and experience a lively satisfaction when one and another are singled out for promotion or the award of some honor or distinction.

It was fortunate that previous to the entry of the United States into the war, the army veterinarian, through the efforts of this association, had received the rank to which he was entitled, and equally fortunate that the work of a past president of this association, C. J. Marshall, now Lieut.-Col. Marshall, and others had gathered information respecting the organization of Army Veterinary Service.

The war found our profession in America unprepared. There were extremely few veterinarians experienced in military work, and these few had gained their experience in the Spanish American War, on the Mexican frontier, or, in the case of Canada, in the Boer campaign. These were but small affairs in comparison with the present war, and the experience gained from them extremely limited. Our civil veterinarians had to learn the business of war from the foundation up, learning and building at the same time—learning to obey the discipline of the army and building on the

foundation of a knowledge of veterinary science the substantial edifice of army veterinary service.

The many phases of army veterinary work have called for extensive and varied accomplishments; the selection and purchase of remounts, the care of these in transit and in depots, their transport over seas, their maintenance in health while in active service, and lastly, their protection from disease, and the treatment of the wounded. These varied activities of the army veterinarian require the exercise of his professional knowledge to a high degree and often put to the test his courage and powers of endurance.

We may well be proud that the veterinary corps of our armies have done their work more efficiently than ever before. They are indispensable to the success of an army in the field. The motor transport ends with the end of the road, and from the end of the road to the guns and to the men in the trenches, supplies must be taken by horses or by human carriers. Horses, mules or donkeys are used for this work as much as possible, and are exposed not only to the casualties of shell fire, but must undergo the hardships inseparable from war, exposure to all kinds of weather, often without shelter, and while doing the hardest kind of work in most unfavorable conditions. Under these circumstances, it is surprising to learn that the mortality of horses in the British Army is less than 10% and compares favorably with the average losses of horses engaged in industrial work in our cities.

War has demonstrated the value of the veterinary profession to the nation and increased its importance as a necessary cog in the machinery of modern life. This leads to improvement in the profession itself. The demand for well educated veterinarians, not only for war, but to care for the enormously valuable livestock of the country, now and hereafter, will increase the attendance at our veterinary colleges, will render it easier for these to obtain the financial support necessary to their success, and render possible a high standard of education and efficiency.

An indication of how the importance of veterinary knowledge has been impressed upon the British is found in the recent establishment of a Veterinary Research Laboratory for the Army. This is at Aldershot, England, and is called "The Research Laboratory, Army Veterinary Services". The director is Colonel Watkins-Pitchford, who worked with Theiler in South Africa for many years, and the staff consists of a bacteriologist, a chemist, an entomologist,

and a pathologist. The investigation of the newer diseases, brought to light during the war, is to be its chief function. Those in authority must appreciate the value of scientific research.

One cannot leave the subject of the veterinarian and the war without referring to another aspect of the situation, the veterinarian at home in war time. The privilege and honor of serving our countries in the army is enjoyed by many, but denied to others whose age, infirmities or circumstances keep them at home. To them have come increased responsibilities. The man who has joined the army and left his practice to his fellow practitioner should not find on his return that his trust was misplaced, and his business taken from him in his absence. The home fires must be kept burning, a welcome ready for these men when they return, and every opportunity afforded for them to resume their former life. Should any fail to come back, and there will be some who have given their lives for freedom just as much as though they fought, their families and dependents must not suffer. It should be our sacred duty to look after them, and that this may be done systematically and carefully, I commend to you that we all continue and increase our contributions to the Veterinary Relief Fund of this association.

There is still another duty of the veterinarian at home. That is, the conservation of our livestock not only to prevent and cure the diseases from which they may suffer but also to encourage and advise our breeders so that they may increase their flocks and herds. The losses of livestock from preventable diseases amount to millions of dollars annually. It is our duty to reduce this loss to a minimum. It can be done by the methods now in use and through the education of the farmer by the broad dissemination of knowledge of livestock sanitation. The country practitioner has a great opportunity to help his country if he will advise his clients not only as to the treatment of diseases, but will interest himself in the farmers' problems regarding feeding, breeding and rearing livestock. There is too much careless and happy-go-lucky breeding of mongrel livestock, too much loss of young animals from ignorance how to care for them, too much waste of feed through ill-balanced rations. These are all matters where a word in time from a well informed practitioner will do a world of good. The veterinarian and especially the country practitioner should be a good stockman as well, and, in my opinion, our veterinary colleges should give their

students instruction in livestock judging, breeding, and management.

This naturally brings me to the subject of veterinary education, a topic of perennial interest and of great importance to this association. The committee on intelligence and education will report on the condition of the colleges and I have no desire to forestall their work. I might, however, refer to one or two features of the present situation.

War has made unforseen demands upon the profession. Men who received a training at college to fit them for general practice were suddenly called upon to perform duties for which they had no previous experience and about which their college teaching had said little or nothing. The future should find the profession better prepared for such emergencies and our veterinary colleges might include in their curricula courses on the management and sanitation of horses, etc., in remount depots, on transport by land or sea, protection against contagious diseases, and the treatment of large numbers of animals affected by such diseases as mange, ringworm, etc. When the war is over, there will be available many men well qualified to teach these subjects from personal experience.

Veterinary education has made great progress, and this association can take credit to itself as one of the most important factors in causing the improvement. Stricter matriculation examination has raised the student to a higher plane, longer terms have increased and broadened his course of study, and laboratory facilities have given him the opportunity to become skillful in handling the test tube and the microscope. In a word, our colleges are now turning out scientific veterinarians, but are they also turning out practical veterinary surgeons?

As the profession rises in the educational scale it attracts men from higher walks in life. The recruits which formerly joined the profession from the blacksmith's forge, and the livery stable, are kept out by the matriculation examination. The farm and the city are now the chief sources of the raw material of the veterinary surgeon. An increasing proportion of the students reach college without previous knowledge of the practical handling of animals. That intimate acquaintance with the habits and customs of horses, for instance, which is common knowledge to the boy on the farm, or to the man who works in livery stable or blacksmith shop, is quite unknown to the city youth. If the college does not give him

the opportunity of acquiring this practical knowledge of animals, he will find himself badly handicapped when he begins to practice.

There is an art, as well as a science of veterinary medicine. To be a good practitioner one must be trained in both the art and the science, and to my mind there is danger at the present time of developing the scientific side of veterinary education to the neglect of that training of hand and eye which lies at the foundation of the veterinary art.

The passing of the Kansas City Veterinary College, which has transfered its students and its records to a State institution, is a sign of the times. This was one of the most successful of the private schools and its closing indicates the growing difficulty of competition with the State colleges. The increasing curriculum, lengthening terms, and expensive laboratories incidental to modern veterinary education, have rendered it more and more expensive to provide, and lessened the profits of private institutions. We may expect in future that veterinary education will become more and more a function of the State, accepting it as a public duty to provide efficient veterinarians to safeguard the health of the immensely valuable livestock of the country.

It may be appropriate on this occasion to refer to the more important discoveries of the year in veterinary science or in other fields which influence our own. In surgery the increasing use of Dakin's solution is reducing the time required for the healing of wounds, and probably, if we may argue from its effects on humans, is greatly lessening the pain suffered by the wounded animal. Fistula and quittor have received much attention and their surgical treatment has been improved. Our secretary, Dr. Merillat, has published a book on this subject of much interest and value to the practitioner.

In medicine, an important aid to the diagnosis of diseases of the viscera has been contributed by a French veterinarian, Dr. J. A. Roger, in an article entitled "Le clavier équin". He advances the theory that pain or disease in a definite part of the abdominal organs has its effect upon some corresponding area on the surface of the body. Pain in the colon, for instance, strikes a sympathetic cord in a limited area on the side of the body, and renders it hypersensitive. The surface of the body becomes a sort of key board, on which one can experiment until the sensitive area is detected. By patient observation and experience, these areas can be mapped

out, and a very definite diagnosis of the seat of the trouble reached. Dr. Roger himself has located many of these areas in reference to the corresponding internal organs and claims to be able to locate with accuracy such lesions as intestinal calculi, ruptures, volvulus, and intussusception.

The anatomy of the nervous system, and the connection between the sympathetic and the spinal nerves in the dorsal and lumbar regions, makes it quite probable that this close relationship between the internal organs and the surface of the body is a fact which has hitherto been overlooked.

In *control work*, the application of modern methods of diagnosis and sanitation are producing gratifying results in diminishing the annual losses from glanders, hog cholera and other diseases. Through the extensive use of mallein, the horses in the field have suffered little from glanders. It is interesting to note, however, that mange has given more trouble in the field than anything else. In ordinary peace times, horse mange is of little importance; in the present campaign in France it has been a veritable plague. The usual remedies, such as dipping, have given only a partial success in its treatment, and now the horses are being "gassed" in air tight chambers filled with the hot fumes of burning sulphur. Much success is claimed for this method.

Some years ago Dr. Leonard Pearson pointed out the clinical similarity between meat poisoning in man and forage poisoning in animals. This suggestion received the attention of Mohler, Buckley and Shippers of the B. A. I., who found that *B. botulinus* is capable of producing fatal results in horses and mules. A very interesting study of botulism was made by Robert Graham, A. L. Bruckner and R. S. Pontius, who have demonstrated the relationship of an organism resembling *B. botulinus* in actual cases of forage poisoning in Kentucky.

Toxicology has received important contributions. One of the most interesting is the discovery of the cause of the disease popularly known as "milk sickness". At one time this was supposed to be due to a bacterium, the *B. lactimorbi*. Investigators in the Bureau of Animal Industry have established the fact that it is the result of plant poisoning by white snake root (*Eupatorium urticaefolium*). Cattle and sheep are affected by this plant, which causes what is commonly known as "trembles", while the milk of affected cows produces in human beings "milk sickness".

Bracken poisoning in horses has been proved by the officers of my department to cause "staggers", and in England, Sir Stewart Stockman shows that it may cause a fatal disease of cattle.

Bovine haematuria is probably a result of a kind of plant poisoning. Hadwen has shown it in British Columbia to be closely related to oxaluria and in all likelihood caused by eating plants containing oxalic acid. Moussu, the great French authority, is favorably inclined to this theory, and Kalkus in Washington has lately written a bulletin in its support.

The shortage of fodder in Western Europe has led to the eating of plants not generally considered good forage, hence Stockman reports poisoning from rag-wort (senecio jacobaea). This disease was known in Nova Scotia for many years as Pictou cattle disease, from the locality in which it was prevalent. The weed had been introduced from Scotland and spread over a considerable area. Now that the cause of Pictou cattle disease is understood, there is little heard of it.

There is one feature in connection with plant poisoning that it not often emphasized. That is, that in many cases, no effects are seen until considerable quantities of the poisonous plant have been consumed and the animal has been under its influence for some time. During periods of drought, when ordinary forage plants are scarce, animals are driven by hunger to eat plants they usually refuse. Under such circumstances are observed cases of plant poisoning not seen at all in times of plenty. Bracken, snake root and ragwort are good examples of these slow poisons.

Parasitology is assuming greater importance to our profession than ever and some recent discoveries indicate an attractive and promising field for the explorer. The life history of that common parasite, ascaris lumbricoides, has recently been worked out by Ransom and Foster in America and Stewart in India. They prove that after the mature eggs are swallowed, the larvae do not remain in the intestinal tract during their development into the adult worm, but migrate through the tissues until they reach the lung. Here they may cause such an amount of irritation as to bring on pneumonia resulting in the death of an animal. The large mortality of young pigs is partly caused by this and has heretofore been wrongly ascribed to other causes, such as swine plague. After undergoing a certain amount of development in the lung, the young worms are coughed up, swallowed and complete their career in the site where they are usually seen.

Important contributions in parasitology have come from Prof. Railliet on the life history of the oxyuris, from Van Es and Schalk on parasitic anaphylaxis, from W. E. Dove in the United States on bots, and by Hadwen and Cameron in Canada, and by Rouband in France on the same subject.

Rouband has exploded an old idea concerning the manner in which the bot larvae reach the stomach of the horse. Formerly it was thought that when the horse licked them off his legs, he swallowed them with his saliva. It is now proved that the young larva sticks to the tongue and burrows beneath its mucous membrane, whence it journeys beneath the surface of the pharynx and oesophagus till it emerges and attaches itself to the wall of the stomach. The migration of these larvae may produce serious lesions in the region of the throat.

Strongyli in horses have been receiving attention and I note with some regret that two parasites well known to me under the familiar names, *S. armatus* and *S. tetracanthum*, have disappeared, and can only be recognized with some difficulty among a crowd of worms rejoicing in brand new names such as *Cylicostomum, Oesophagodontus, Triodontophorus* and *Gyalocephalus*. The new nomenclature is doubtless scientific and probably necessary, but the modern parasitologist is adding much to the white man's burden, especially of those veterinarians not freshly graduated.

The life history of animal parasites is most interesting and strange facts are frequently brought to light. A recent discovery shows that one of the bot flies of South America (*Dermatobia*) catches blood sucking flies and lays its eggs upon them, so that they may be carried on to the host they wish to infect. Recently much good work has been done on parasites, not only of horses and cattle, but also of swine, sheep and dogs. Hall of Detroit deserves mention for excellent progress on dog parasites.

The observers I have mentioned and other workers in this field have lifted a corner of the veil with which nature has so long concealed the mysteries of parasitic life. The prospect thus open to our view is offering a tempting field for the investigator and promises a rich reward to the diligent and patient worker, and valuable results in the protection of our livestock. Parasites exact a heavy toll every year, the damage running into millions of dollars, so that the value of these efforts to control their ravages can hardly be overestimated.

The past year has cost us the lives of several distinguished men, and it is fitting that we should here refer to some of them and offer a tribute to their memory. Dr. Melvin, the Chief of the Bureau of Animal Industry, was taken from us last December, after a long and plucky fight against a slow and relentless disease. As a public man and the head of a large and important department of the public service, Melvin showed himself capable of dealing successfully with the immense work of the Bureau, a work which grew and developed enormously under his care. During his administration, the present system of federal meat inspection was begun, and has grown tremendously in size and importance. He had also to deal with more than one outbreak of foot-and-mouth disease, the last, occurring in 1914, the most serious in the history of the country. Not a little of the success of the Bureau in dealing with this was due to his wisdom. The efficiency of the Bureau service today is a tribute to his skill as an administrator, as well as to that of his able successor, Dr. Mohler.

While the country, as a whole, may well mourn the loss of this able and efficient public officer, his personal friends, and they are many, well remember him affectionately for his sincere friendliness, and the unfailing courtesy and interest that characterized his intercourse with others. Melvin was a man to be both admired and loved. Admired for his work and loved for his genial personality. May his memory be kept green.

The death of Liautard marks an epoch in the history of the veterinary profession in America. Liautard was one of the makers of that history, and by his teaching, by his example, and by his untiring industry has done more than any other American to place our profession where it is today. As one of the organizers of the United States Veterinary Medical Association he helped to lay the foundation of this great organization, which is now the largest veterinary society in the world. As editor of the *American Veterinary Review* he exercised an influence over the whole profession in America, and always used that influence for progress and improvement. As an author, his contributions to our literature placed many useful text books in the hands of the student. These were a few of his activities, and in all of them he attained pre-eminence. But it is on his reputation as an educationist that his fame chiefly rests. For many years Liautard was the moving spirit in veterinary education in New York, and as Dean of the New York

College of Veterinary Surgeons, and later as Principal of the American Veterinary College, he set the pace in veterinary education. His standing as a graduate of that great veterinary school at Alfort, France, his unique personality and his great skill as a teacher, combined to give him great influence over his students. There are doubtless many in this audience who could give testimony to the great affection with which he was regarded by his students, and to the value his influence and example have been to them in their lives. Their loss is a personal one. A great teacher and friend has been taken from them. But from the rest of us, the veterinary profession as a whole, there has gone one of our great men, full of years and of honors. One of those gifted few who, rising above the common level, see clearly the distant goal, and point our steps in the right direction. The profession owes much to Liautard and in recognition of that debt we should, I think, take steps to honor his memory in some more tangible way than by a resolution. I would suggest that a committee be appointed to formulate a plan for this purpose, and to report before the close of this meeting.

I cannot let this occasion pass without also referring to the death of Sesco Stewart. He was president of this association many years ago, when I first joined it, and has always taken a most active interest in it. Those who attended the meeting in Kansas City last year will remember his untiring efforts to ensure the success of the meeting, and to make us feel at home in the fine building his industry and success had provided for the Kansas City Veterinary College. He was a skillful and persistent pleader of the cause of the private schools whenever he felt that the association was going too fast in raising the standard of veterinary education. But when a standard was once adopted, he was loyal to the association in carrying it out. His college was marvellously successful, and the facilities it afforded for teaching, and for the well being of the students were a surprise to those that saw it for the first time. It was a monument to his energy, sagacity and industry. His place in this association will be hard to fill, and we will long miss his regular attendance, his interest in every important question, and especially in the welfare and progress of the profession.

The work of the association during the year has felt the influence of the great war. Several of our officials, including our secretary, Dr. Merillat, are actively engaged in military affairs, and it

became necessary to appoint others in their places to carry on. Through the kindness of Dr. Mohler, Dr. Day was permitted to undertake the duties of secretary, with the assistance of Dr. Kroner, Dr. Merillat's assistant. I trust you will find that in spite of these changes, the work of the association has not suffered.

But I have already detained you too long. You must be eager to attack the excellent program which has been provided for you, and I gladly give the signal to go "over the top".

ASSOCIATION MEETINGS

REPORT OF THE 25TH ANNUAL MEETING OF THE MISSOURI VALLEY VETERINARY ASSOCIATION HELD AT OMAHA, NEBRASKA

The 25th annual meeting of the Missouri Valley Veterinary Association, held at Omaha, Nebraska, July 15, 16 and 17, was marked by a good attendance, and a very keen interest in the various problems under consideration.

The program was opened by an exhaustive report on a few of the common drugs, by the committee on therapeutics, presented by Dr. W. E. Stone, chairman of the committee. Reports of other standing committees were not as complete as might be desired, due to their recent appointment and detention from attendance by other pressing duties.

Among the highly commendable papers rendered, were the following: "Some Complications Following Influenza" by Dr. W. P. Bossenberger, Williams, Iowa; "Hog Cholera, Its Control and Eradication" by Dr. C. F. Harrington, Denver, Colorado; "Interesting Cases in Connection with Hog Cholera Control Work in Iowa" by Dr. J. S. Koen, Des Moines, Iowa; "The Control of Some Important Infectious Diseases in the Conservation of our Livestock" by Dr. A. Eichhorn, Pearl River, New York; "The Conservation of Edible and Inedible Fats" by Dr. J. I. Gibson, Des Moines, Iowa.

The author of the latter paper pointed out the enormous waste in animal by-products resulting from lack of suitable methods and regulations for collecting and extracting these products from dead animals. A special resolution covering this problem was adopted

by the association, which it is hoped may serve as a stimulus to the entire country to take up this important and timely work.

Dr. Eichhorn discussed the pressing need of conserving the animal food supply by the application of sanitary rules and biologic therapy for reducing the enormous losses brought on by the spread of our great animal scourges. Among the points emphasized, should be mentioned the dissemination of anthrax infection through the innundation of land by streams polluted with the remains of carcasses of dead animals, and by tanneries handling hides of diseased animals. He recommended the active cooperation of veterinarians with the sanitary authorities, to suppress those dangerous diseases which constitute so great a menace to the present welfare of our country.

Dr. Bossenberger's paper showed evidence of careful and painstaking study of the many complications following attacks of influenza in horses. Among these complications he mentioned pneumonia, pleurisy, myocarditis, arthritis, conjunctivitis, in various forms and combinations, recommending rational means of treatment and prevention.

Dr. Harrington discussed the plan practiced by the B. A. I. in the control of hog cholera and related infections. An interesting discussion was elicited, tending toward careful differentiation of porcine diseases, satisfactory treatment depending so largely upon a proper comprehension of the disease or combination of diseases present in a herd. Considerable progress seems to have been made in the control of hemorrhagic septicemia or swine plague by the use of killed cultures, either alone, or in conjunction with hog cholera serum, where protection from both diseases must be sought. Necrotic enteritis and stomatitis of pigs were generally conceded to be the most troublesome of the complicating diseases. Treatment by the employment of copper sulphate or permanganate of potash in the drinking water, has met with success in the hands of many.

Dr. J. S. Koen gave a number of interesting observations made during several years' control work in the State of Iowa. Generally speaking, the hog cholera situation in the Missouri Valley is highly satisfactory. Serum producers, however, are finding their laboratory facilities insufficient to take care of the calls made upon them for anti-hog cholera serum.

A paper of unusual merit and interest by Dr. L. Van Es, who

has recently taken the chair of Veterinary Pathology at the University of Nebraska, dealt with the possibilities and limitations of the State diagnostic laboratory in conducting laboratory investigations to assist the practitioner. He placed especial emphasis upon the necessity for both the practitioner and upon the laboratory men acquiring a comprehension of the nature of each other's work, in order that their cooperation may prove of greatest value. The practitioner in need of laboratory assistance was given specific directions as to preparing material for shipment, and was impressed with the necessity of supplying all available data relative to the case in hand in order that the laboratory might work more intelligently.

Dr. A. W. French, Cheyenne, Wyoming, related his experience with the intradermal tuberculin test. During the past year his department has applied the test to approximately 12,000 cattle, all reactors being later tested and in all cases confirmed by the thermal test given from four to seven days later. He prefers the intradermal test, particularly on range animals, on account of the convenience in handling, and the possibilities for doing a large amount of work with a small expenditure of time and labor. To date, the intradermal test seems to have proved fully as satisfactory as the thermal. He recommends the two tests in conjunction, for beginners, until a knowledge of the character of the reaction from the intradermal test is acquired by experience with those reacting.

Dr. G. H. Glover handled, in a very sane and commendable manner, the problem of "The county agent in relation to the veterinary practitioner". He pointed out that the field of each is distinct; that it is possible for them to aid each other materially, by getting together and discussing their problems in a thoroughly friendly manner, and the futility of creating ill feeling by injudicious statements and actions. He made a strong plea for the settlement of any differences which may arise, first through personal and friendly contact with the agent himself; failing in this, that the matter be taken up through the director of the veterinary department at the State college, who has authority to pass upon all projects dealing with veterinary matters, which are undertaken by such agents. The complaint may be carried to the director of extension, the president of the college, and still higher, when necessary.

Other papers of note were read by Dr. C. E. Salsbery, Kansas

City, Missouri, on "Observations on the Use of Biological Products"; Dr. D. M. Campbell, on "The Duties of Veterinarians during the War Period"; and "Sunstroke in Horses" by Dr. W. S. Nichols.

The social program was somewhat modified to conform to war conditions, a patriotic program consisting of an illustrated talk by I. C. Brenner, vocal solos by Dr. J. I. Gibson, and a community singing of patriotic airs, being substituted for a banquet. Dr. W. H. Hoskins gave an inspiring address.

The officers for the ensuing year are as follows:

President, C. C. Hall, Omaha, Neb.; vice president, J. W. Chenoweth, Albany, Mo.; secretary-treasurer, R. F. Bourne, Ft. Collins, Colo.; directors, L. U. Shipley, Sheldon, Iowa; A. T. Kinsley, Kansas City, Mo.; B. W. Murphy, Topeka, Kans.; P. L. Cady, Arlington, Neb.; G. H. Glover, Ft. Collins, Colo.

In each case, the officer elected was the only nominee presented. Twenty-eight additional members were added to the rolls, and as a mark of appreciation for conspicuous service rendered to the veterinary profession, Drs. W. Horace Hoskins and A. Eichhorn were elected honorary members.

A motion to remit the dues of all members in active service with the army was passed by unanimous vote. Two veteran members, Drs. James Vincent of Shenandoah, Iowa, and J. T. Burns, Walnut, Kansas, were reported as having died during the past year, and appropriate resolutions extending the sympathy of the association to their families were adopted. Approval of a higher salary standard for employees of the Bureau of Animal Industry, as a means of securing adequate and competent veterinary service in this Bureau was covered in a special resolution.

About forty ladies were in attendance, and a program of entertainment for which they are most grateful and appreciative, was arranged by the wives of the local members. All in attendance felt that the meeting was highly satisfactory, and at no time were meetings of its character more necessary to the profession, the livestock interests of the nation, and the concerted action of the profession toward the assistance of the Government than at the present time.

The following resolutions of general interest were adopted:

ANIMAL BY-PRODUCTS

WHEREAS, The present method of disposal of the carcasses of

dead animals by burial is not only unsanitary but wasteful of valuable animal products; therefore, be it

Resolved, By the Missouri Valley Veterinary Association that the various States take such action as will provide for the disposition of animal carcasses in a manner that will conform to modern sanitary requirements and make available various valuable animal products so essential to agricultural interests and the successful prosecution of the war; and be it further

Resolved, That copies of this resolution be sent to the Secretary of War, the Secretary of Agriculture and the livestock sanitary authorities of the various States.

THE USE OF HORSEFLESH

WHEREAS, Horseflesh is a nutritious and wholesome food and not objectionable to many people in this and other countries; therefore, be it

Resolved, By the Missouri Valley Veterinary Association that the Federal Government and the various States make available this valuable meat, and that they promulgate such rules and regulations as will safeguard its use; and we further

Resolve, That copies of these resolutions be sent to the Secretary of Agriculture and the livestock and pure food authorities of the various States.

INSPECTION OF IMPORTED HIDES

WHEREAS, The war demand has caused a great increase in the importation of hides and other animal products from countries without adequate livestock sanitary service; and

WHEREAS, Such importations are a constant and serious menace to the livestock industry and the public health of the United States because of the danger of transmitting serious diseases; therefore, be it

Resolved, By the Missouri Valley Veterinary Association that the federal authorities provide that proper veterinary supervision shall be maintained at ports from which such shipments originate, and that copies of this resolution be sent to the Secretary of the Treasury and the Secretary of Agriculture.

PAY OF BUREAU VETERINARIANS

WHEREAS, There is an immediate and growing need for competent and thoroughly trained veterinarians for the federal service; and

WHERAS, The recent increase by the Secretary of Agriculture

is appreciated, yet such important service has not advanced in proportion to the educational requirements and the increased cost of living; therefore, be it

Resolved, By the Missouri Valley Veterinary Association that we recommend that such changes be made in the laws that will provide for the proper remuneration of the veterinarians in the federal service and to this end we pledge our support.

PLEDGE OF LOYALTY

WHEREAS, The exigencies of war demand the best efforts of all patriotic citizens, individually and collectively; and

WHEREAS, We as official and practising veterinarians are the direct conservers of the health of food-producing animals of the nation; be it

Resolved, That we pledge our best efforts and personal service to the President of the United States and to all persons responsible for the successful prosecution of the war.

APPRECIATION TO LOCAL ORGANIZATIONS

Resolved, By the Missouri Valley Veterinary Association that we extend our sincere thanks to the local committee on arrangement, the Chamber of Commerce, the Ak-Sar-Ben and the management of the Hotel Rome for their many and splendid endeavors that have made this meeting so successful and enjoyable.

R. F. BOURNE, Secretary.

THE SOUTHWESTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

The midsummer meeting of the Southwestern Michigan Veterinary Medical Association was held at Lake of the Woods, Decatur, Mich., Thursday, Aug. 1. Except for a few minor changes the following program was carried out to the letter:

The meeting was called to order by President Hosbein at 10:00 A. M. After the president's address and routine business, two unusual and interesting case reports were presented by Dr. J. W. Randall and Dr. James M. Miller. A paper on "Death by Asphyxia in Horses from Auto Gas" was presented by Dr. E. C. Goodrich, St. Joseph, Mich.

At the afternoon session the following papers were presented: "The Accredited Herd and Its Importance to Livestock Breeders," W. R. Harper, Secretary State Livestock Sanitary Commission.

"Many veterinarians have gone to get the 'Huns'; large districts are left without veterinary service while other territories are overcrowded with veterinarians. How can we overcome the situation for the period of the war?" Answer by Dr. Geo. Dunphy, Lansing, Mich., State Veterinarian.

"Cholera Immune Herds," County Agricultural Agent Wickard of Van Buren County.

"Let's Get Together and Keep Together and Help Win the War," Harry Lurkins, County Agent.

After the presentation of papers the free clinic was held, in charge of Dr. John Neville, assisted by Drs. Howard, Japink, Krieger, Magrane, Clemo, Graham, Bowman, McMichael and Winter.

The ladies were entertained with a boat ride and music while the members held the afternoon session.

This was the best attended meeting ever held. Seven new members were taken into the association.

The next meeting will be held in January, date and place to be decided at a later date.

E. C. GOODRICH, Secretary and Treasurer.

NEW YORK STATE VETERINARY MEDICAL SOCIETY

The twenty-eighth annual meeting of the society was to have been held in Brooklyn in the summer of 1917. Due to the uncertain status of affairs it was voted by the members to dispense with the usual meeting in order that the veterinarians would be in a better condition to meet the demands of the country upon them. As time progressed and it was better known just what our profession could do it was deemed unwise not to hold a meeting this summer. The executive committee accordingly at a meeting held in January decided to submit the proposition to a vote of the members. A canvass was made and a large majority of those voting chose Ithaca as the place for the meeting. Later the committee fixed on July 24, 25 and 26 as the time.

The meeting convened at 10:00 A. M., July 24, at the New York State Veterinary College at Cornell University. In place of President J. G. Schurman, who is absent on leave for Y. M. C. A. work abroad, Prof. D. S. Kimball welcomed the society to the University. Prof. Kimball is acting president while Dr. Schurman is

absent. Attorney Fitch Stephens gave an address of welcome on behalf of the City of Ithaca. Dr. W. B. Switzer did great credit to the society in his response to these two excellent speakers. The most of the first morning was taken up by the addresses of welcome and the usual order of business of the association. The paper on "Calf Scours" by Dr. W. A. Hagan and Dr. C. M. Carpenter was given at this session.

The afternoon was taken up with the literary program. Dr. John McCartney gave a paper on "Some Present Day Problems in Milk Sanitation"; Dr. W. L. Williams on "Abortion and Sterility", and Dr. Leo Price on "A Preliminary Report on the Intrapalpebral Mallein Test". These papers were all excellent and elicited a great deal of valuable discussion.

In the evening the members and visitors enjoyed a good dinner at the Clinton House. The after dinner speakers were S. Bruce Wilson, Y. M. C. A. representative with the U. S. Aviation and Vocational schools at Ithaca, and Captain W. E. Muldoon of the V. T. S., Camp Lee, Va. Mr. Wilson was formerly at Camp Dix and was well able to talk on his subject "How Our Army Is Made". Captain Muldoon said that he didn't know what he was going to talk about when he started and didn't know what he had said when he was through. With all this handicap he gave a most interesting and instructive talk on the men in the V. T. S. Dr. Way, who was our impromptu toast-master, called on Dr. Wills, Dr. V. A. Moore, and Dr. W. H. Hoskins for short talks.

The program for the second day of the meeting was varied and highly instructive. Dr. Cassius Way and Dr. A. G. Hall gave a paper on "The Tuberculin Test and the Seven-Day Re-Test", Dr. A. Slawson on "Serum Treatment of Canine Distemper—Results During the Present Year", Dr. H. S. Beebe on "A Few Remarks in Reference to Recent Veterinary Legislation", Dr. G. A. Knapp on "Some Recent Experiences with Hemorrhagic Septicemia in Cattle", Dr. R. W. Gannett on "Clinical Observations on Foot Diseases of the Horse", Dr. H. B. Leonard on "Accredited Herds", Dr. S. A. Goldberg on "Microscopic Foreign Bodies in the Tissues", and Dr. E. Sunderville read the paper prepared by Dr. G. S. Hopkins on "Facial Sinuses of the Sheep". Clinic was held throughout the morning of the third day in the operating rooms of the college.

On the evening of the second day Dr. and Mrs. V. A. Moore

entertained the society at a Lawn Party at their home at 914 East State Street. Refreshments were served. Music and readings helped to entertain their guests throughout the evening. This evening was one of the best parts of the program. For the visiting ladies a lunch at the University Club, a motor ride about the city, "Retreat" at the field of the Aviation School, a boat ride on Lake Cayuga, lunch at the Cafeteria of the Home Economics Building of the University, an organ recital by Prof. J. T. Quarles, a theatre party and the evening entertainments furnished a very pleasant ime.

Dr. Geo. A. Knapp of Millbrook was elected president for the ensuing year, Dr. H. S. Beebe of Albion vice president, Dr. C. E. Hayden of Ithaca secretary-treasurer, and Dr. H. J. Milks of Ithaca librarian. Sixteen new members were recommended by the board of censors and were duly elected to membership. The seventeenth application was received on the last day of the meeting and since the applicant is one of the profession most highly eligible he will be elected at the next annual meeting. Dr. James Law and Dr. Wilson Huff were elected to be honorary members of the society.

There has never been held a better meeting of the New York State Veterinary Medical Society than the twenty-eighth annual meeting. Attendance, excellency of scientific papers and entertainment were all above par. However, the meeting at Brooklyn next year is to be better than the one just closed.

C. E. HAYDEN, Secretary-Treasurer.

OREGON AND WASHINGTON VETERINARY MEDICAL ASSOCIATIONS

The Oregon and Washington Veterinary Medical Associations held a joint meeting at the Imperial Hotel, Portland, Oregon, June 13, 14 and 15, 1918. More than seventy veterinarians were present. This is a much larger number of veterinarians than has ever before been assembled for any meeting in the Northwest. The two state presidents, Doctor L. C. Pelton of Washington and Doctor S. M. Reagan of Oregon had Doctor S. B. Nelson, Dean of Veterinary College of Washington State College, preside at the meeting.

With Doctor Nelson in the chair, the meeting was called to order Thursday morning June 13 and an address of welcome was

given by Mr. C. C. Colt, President of the Union Meat Company of Portland. Doctor Pelton responded. The first paper was by Doctor C. W. Lassen of Pendleton on "The Intrapalpebral Mallein Test". Lieut. E. B. Osborne of Camp Lewis led in a discussion of this paper. Lieut. Osborne has tested some 3000 horses with this test in the past three years during which time he has acted as Assistant State Veterinarian of Oregon or as Veterinarian in the Army. All veterinarians present who have used this test were enthusiastic in its praise.

The next paper was by Doctor W. H. Lytle, State Veterinarian of Oregon, on "The So-Called Walking Disease of Horses". Discussion was led by Doctors Nelson and Simms. This peculiar and baffling disease has appeared in the wheat belt of Oregon and Washington from time to time during the last ten or fifteen years. Losses have been very heavy at some periods. Doctor Lytle seemed to believe that the trouble is quite possibly of parasitic origin.

Doctor J. W. Cook of Brownsville read a paper on "Diarrhea in Horses". He reported that this trouble was very common in his section of Oregon during the past winter. Some seventy-five to eighty cases occurred in a very small area. It was recalled that the past winter had been a very mild one with a great deal of moisture. The possibility of a mold that grew on the hay as being the causative agent was suggested. Doctor Cook reported that practically all cases yielded to treatment very nicely. Several other veterinarians practicing in the Willamette Valley reported that this disturbance was more or less common in their neighborhood during the winter months.

Doctor E. C. Joss, Federal Inspector in charge of Western Division, read a paper on "New Zealand and Australian Meat Inspection System and the Possible Adoption of this System in the Pacific Northwestern States". The discussion of this paper was led by Doctor E. E. Chase, Chief City Meat Inspector of Portland, Oregon. Two papers on tuberculosis were read, one by Doctor Sam B. Foster, veterinarian in charge of tuberculosis eradication in Oregon and Washington, and the other on Avian tuberculosis by Doctor Peter Hanson, Veterinary Inspector of the City of Portland. Doctor Foster reported some very interesting results obtained in eradicating tuberculosis in the pure-bred herds of the Northwest. Doctor Hanson exhibited a tubercular fowl, showing the disease in the advanced stage. He reported that Avian tuber-

culosis is very common in the Pacific Northwest and that large numbers of tubercular fowls are slaughtered at Portland.

There were three papers on hog cholera. The first was by Mr. W. F. Richter of Portland, Oregon, a representative of the Cutter Laboratories of Berkeley, California. The second was by Doctor Beattie of the Union Stock Yards of Portland, Oregon. The third was by Doctor W. W. Sullivan of Twin Falls, Idaho. Doctor Sullivan is the Federal Inspector in charge of hog cholera control in the Twin Falls district. It seemed to be the opinion of the veterinarians present that the serum alone method of vaccination is advisable in the major portion of the Northwest. Practicing veterinarians reported that hog cholera is not at all prevalent in the Northwest at the present time. The State Veterinarians of both Oregon and Washington advise that very few outbreaks of this disease are being reported and that they are being controlled quite nicely through the use of serum alone. Doctor Sullivan emphasized the fact that vaccinating to prevent hog cholera is not a hit or miss method but that it is a scientific procedure requiring the careful work of a scientific man if the proper results are to be obtained.

A paper on anthrax was read by Doctor C. A. Jones of Sedro Woolley, Washington. Doctor Jones gave some of his experiences in recent outbreaks of this disease.

A paper entitled "Diagnosis of Diseases of Sheep", prepared by Doctor E. T. Baker of Moscow, Idaho, was read by the secretary of the Washington association. This was followed by very interesting discussions. A case report by Doctor H. Nunn of Corvallis regarding tetanus in a mare with a suckling foal was read by the secretary of the Oregon association.

Doctor C. H. Schultz of the Department of Health and Sanitation of Seattle, Washington, read a paper entitled "Mysterious Losses Among Cattle in the Pacific Northwest". This paper reported the results of several years' investigations of diseases of cattle in this section of the country. Doctor Schultz brought out the fact that coccidia are found in many outbreaks of a so-called mysterious disease among cattle. He exhibited slides showing beautiful specimens of coccidia in all of their various stages. These organisms were obtained upon the feces of animals suffering from the disease. Nearly every veterinarian present reported that cattle losses in his district had been quite common in the past and that symptoms had been very similar to those described by Doctor Schultz.

A portion of Friday, June 14, was spent at the packing plant of the Union Meat Company, Portland, Oregon. A most delightful luncheon was served to the veterinarians by the Meat Company. During the afternoon of the same day the veterinarians visited the slaughter house at which horses are killed for the Portland market. Doctor E. E. Chase, Meat Inspector of the city, slaughtered a tubercular cow and demonstrated the method of examining slaughtered animals for tuberculosis.

On the night of Friday, June 14, a most delightful banquet was served at the Imperial Hotel.

Election of officers for the two associations resulted as follows: For the Washington association—Doctor L. C. Pelton of Seattle, president; Doctor W. Ferguson of Spokane, vice president; Doctor Carl Cozier of Bellingham, treasurer. For Oregon—Doctor F. E. Eames of The Dalles, president; Doctor Roy Smith of Eugene, first vice president; Doctor B. E. Nevel of Prineville, second vice president; Doctor Peter Hanson of Portland, fourth vice president; Doctor B. T. Simms of Corvallis, secretary and treasurer. It was voted to hold another joint meeting in 1920, electing Portland as the meeting place two years hence.

On Saturday morning, a polyclinic was held at the hospital of Doctor G. H. Huthman. On Saturday afternoon the veterinarians made an automobile trip up the famous Columbia River Highway. This is considered one of the most scenic highways in America. Even Doctor C. H. Schultz of Seattle admitted that this was the equal of the famous scenery of Switzerland, saying that the trip made him homesick for his Swiss mountains.

Thanks are especially due to Doctor E. E. Chase of Portland who, as chairman on the committee of local arrangements, made the joint meeting a most successful one. B. T. Simms.

VIRGINIA VETERINARY MEDICAL ASSOCIATION

After the business transactions of the association and the President's address the following program was carried through:

Some Phases of the Work of the Bureau of Animal Industry in Its Relation to the War—J. R. Mohler, Chief of the B. A. I., Washington, D. C.

Antibodies (tissue reacting products) in Their Fight Against Infection—G. A. Roberts, Raleigh, N. C.

Thoracic Choke Due to Abnormal Trachea—L. O. Price, Blacksburg, Va.

Parturient Apoplexy—W. G. Chrisman, Blacksburg, Va.

Lieut.-Colonel C. J. Marshall, Assistant Director of Veterinary Service, Washington, D. C., was unable to be present to give his paper on Some Phases of Army Veterinary Activities.

On July 12, at 1 o'clock, luncheon was served to sixty members and guests. The guests of honor were Governor Westmoreland Davis; President J. D. Eggleston of the Virginia Agricultural College; Hon. J. Thompson Brown, Chairman of the Virginia Livestock Sanitary Board; Dr. G. A. Roberts, Professor of Veterinary Science of the A. & M. College, Raleigh, N. C.; Major Gill, Veterinarian in Charge of the U. S. Embarkation Station at Newport News, Va.; Captain Gregg, in charge of the British Remount Station, Newport News, Va., and Lieut. Glover, his assistant; Captain Dunn, Lieuts. White, Mickle, Kelsey and Naylor.

After adjournment many of the veterinarians visited Camp Hill to see the largest veterinary hospital in the world.

The next meeting of the association will be at Richmond, Va., Jan. 16 and 17, 1919. W. G. Chrisman, Secretary.

COLORADO VETERINARY MEDICAL ASSOCIATION

By far the most interesting meeting which the Colorado Veterinary Medical Association has ever held was their semi-annual gathering at Ft. Collins on June 27 and 28. The attendance was large considering the small size of the association and the interest was very intense. The most important items of business were amendments to the by-laws providing for raising the dues from $2 to $3 per year and striking out the requirement that applicants for membership should hold a license to practice within the State. This latter change resulted immediately in veterinarians from both Wyoming and New Mexico joining the association, there being no organization in either one of these states. Six new members were elected.

Entertainment consisted in an automobile ride for the ladies some thirty miles up the Poudre Canon, followed by a picnic lunch near the river for all members and their ladies. The noon luncheon was taken at the mess hall with the two hundred and six soldiers who are located at the college for special training in the Mechanic Arts.

Drs. A. T. Kinsley and H. Jensen of Kansas City were present to add to the interest taken in the program. The president's address dealt largely with our duties and obligations as veterinarians in the present war. Some cases of probable mistaken diagnosis were detailed by D. C. Patterson, one of them particularly being a question as to diagnosis where hogs were dying of what was variously diagnosed as cholera and necrobacillosis.

Hemorrhagic septicemia in sheep was considered more formally by A. A. Hermann and I. E. Newsom, the former giving his experience in treating large numbers of these animals by means of bacterins and the latter offering a detailed account of some experiments which seem to show that the disease is quite prevalent in the State. Later the discussion became general and nearly every one took part.

Dr. A. W. French, State Veterinarian of Wyoming, read a paper on the "Intradermal Test for Bovine Tuberculosis", giving his experience on many thousands of animals in the State where the testing was conducted from the State Veterinarian's office. He had no hesitancy in saying that for the conditions as they exist in Wyoming the intradermal test is much to be preferred over the subcutaneous.

The high point of the meeting, however, came in the discussion of hog cholera. Dr. E. E. Tobin discussed what constituted a proper fee for the use of biologics. This resulted in the appointment of a committee to report on the question. Dr. A. G. Wadleigh, who is veterinarian to the Monte Vista Hog Growers' Association, gave some suggestions on vaccinating hogs as the result of his experience. Dr. C. F. Harrington, B. A. I. hog cholera specialist, working in the State Veterinarian's office, gave a paper on "Cholera, Its Control and Eradication". Dr. A. T. Kinsley discussed very clearly and concisely the differential features of the various diseases which may be confused with hog cholera. His address brought out a great deal of discussion regarding the indication of the various symptoms and lesions which have formerly been considered as being associated with this disease. On the following day, Drs. Kinsley, Harrington and Thrower conducted a post mortem examination on two pigs that were affected with a disease that simulated hog cholera. On these animals they exemplified what had been brought out in the discussion the day previously.

In fact, it was the concensus of opinion that this demonstration was the most helpful single event that occurred during the meeting.

A round table discussion on "The Relation of the Veterinarian to the County Agent" was led by Dr. G. H. Glover and participated in by Drs. E. H. Lehnert of the University of Wyoming, G. W. Dickey of Colorado Springs and H. T. French, Director of the Extension Department in Colorado.

The clinic lasted all day Friday and was replete with interesting operations and cases. A demonstration of hog cholera vaccination was given by Dr. H. E. Kingman of the Colorado Agricultural College and Dr. J. D. Thrower of the Denver Hog Ranch Company. Each demonstrated his own technique. After the members had gone many clinic cases remained untouched for want of time.

I. E. NEWSOM, Secretary.

NATIONAL ASSOCIATION OF BUREAU OF ANIMAL INDUSTRY VETERINARIANS

At the annual meeting of the association the following temporary officers were elected:

President, Dr. J. S. Koen, Des Moines, Iowa; secretary, Dr. S. J. Walkley, Milwaukee, Wis.; treasurer, Dr. L. Enos Day, Chicago, Ill.; vice president-at-large, Dr. F. P. St. Clair, Omaha, Neb.; vice president eastern zone, Dr. Leland D. Ives, New York City; vice president central zone, Dr. M. Guillaume, Chicago, Ill.; vice president southern zone, Dr. J. S. Grove, Oklahoma City, Okla.; vice president western zone, Dr. B. W. Murphy, Topeka, Kansas.

S. J. WALKLEY, Temporary Secretary.

SOUTHERN TIER VETERINARY MEDICAL ASSOCIATION

The fourth annual meeting of the Southern Tier Veterinary Medical Association was held at Binghamton, N. Y., on July 5, 1918. Thirty-four veterinarians were present.

During the morning a clinic was held at the hospital of Dr. A. W. Baker, who had provided ample material. The following cases were handled: Roarer, examined by Dr. P. J. Axtell and pronounced inoperable; repulsion of lower molar, Dr. R. R. Bolton and Dr. D. W. Clark; sterile cow, Dr. R. R. Birch; cryptorchid, Dr. P. J. Axtell; tumor, dog, Dr. H. J. Milks.

Following luncheon at Hotel Bennett the meeting was called to order by President Battin, and a short business session was held,

during which nine new applicants were admitted to membership. Dr. H. J. Milks was elected president; Dr. P. J. Axtell, vice president, and Dr. R. R. Birch was reelected secretary-treasurer.

Dr. Leonard of the Bureau of Animal Industry, Tuberculosis Eradication Division, read a very concise and interesting paper entitled "Accredited Herds" in which he explained the aims and methods of the system followed by the Bureau, with respect to placing herds on the accredited list.

This paper was discussed by Dr. V. A. Moore and Dr. J. G. Wills. Dr. Moore directed special attention to the dangers incident to accrediting herds without the most searching methods of establishing clean bills of health, and to the consequent discredit which might fall on an otherwise excellent system. He stated further that in districts where herds are badly infected, it is especially dangerous to place too much confidence in the health of animals that fail to react to tuberculin.

Dr. Wills brought out the point that in cleaning up herds preparatory to placing them on the accredited list, the practicing veterinarian has an important part to play, and that it is only through intelligent and sympathetic understanding between herd owner and veterinarian that any progress worth while can be expected.

Dr. R. R. Bolton read a carefully prepared and well received paper on "The Examination of the Eye". This is a phase of veterinary medicine that receives too little attention, and Dr. Bolton's paper covered the subject thoroughly.

In the enforced absence of Dr. E. F. Vorhis, who was to read a paper entitled "The Business Side of a Country Practice", Dr. P. J. Axtell discussed the subject extemporaneously, calling attention to the business and professional aspects of veterinary practice. He regarded professional ability as most important, but asserted that it should be supplemented by business ability and business methods, as people have no confidence in one who is unbusinesslike.

Dr. J. W. Ardell discussed the subject from the standpoint of the young practitioner, just establishing a practice. His remarks might be summed up thus: "Be at your place of business and do not permit that place of business to be a livery stable, unless you are manager."

After voting fifty dollars to the relief fund for Belgian and French veterinarians the meeting adjourned.

R. R. Birch, Secretary.

REVIEW

THE CORNELL VETERINARIAN—SHEEP NUMBER

Vol. VIII, No. 3, July, 1918

From time to time and as conditions have warranted, it has been the policy of the *Cornell Veterinarian* to publish special numbers or to use single issues for opportune subjects. The regular July issue is devoted to sheep. The editor, Dr. E. M. Pickens, and Dr. V. A. Moore each have editorials that are succinct. The part that the veterinarian may and should play in giving aid in the revival of the sheep industry as an important national industry is very aptly shown in the editorial by Dean Moore.

Following the editorial pages there are nine leading articles. "Farm Flock Husbandry" is presented by M. J. Smith, Department of Animal Husbandry, Cornell University. Dr. G. S. Hopkins has an illustrated and instructive article on "The Paranasal or Facial Sinuses of Sheep". The knowledge of these sinuses is essential to the veterinarian should it become necessary to remove the larvae of oestrus ovis from them. Dr. E. Sunderville has written on the "Anatomy of the Digestive Tract of Sheep", and C. E. Hayden on "Digestion in the Sheep". "The Veterinarian and Sheep Practice: Especially as It Relates to Intestinal Parasites", delivered before the students of the New York State Veterinary College at Cornell University by Dr. Cooper Curtice of the Bureau of Animal Industry, is extremely practical and helpful. Dr. James Law has written a thorough discussion on "Digestive Disorders (colic) in Sheep". This article is followed by one from the pen of Dr. V. A. Moore on "Infectious Diseases of Sheep". The discussion is the usual clear, scientific presentation for which the author is noted. "Obstetrics of Sheep" should and does receive consideration at the hands of Dr. W. L. Williams. The readers of the number are fortunate to have these three articles from the men of all the profession most competent to write them. Dr. J. N. Frost and Dr. E. B. Hopper have a short but helpful paper on "Docking and Castration of the Young Lamb". There are six case reports, all of which are written from sheep practice. The extraneous matter in the number is very little. Practically all of it is given over to the sheep industry. As one reads the issue it cannot but be felt that its purpose to stimulate the interest and knowledge of both breeders and veterinarians in the revival of the sheep industry will be fulfilled.

C. E. HAYDEN.

MISCELLANEOUS

EDITOR DALRYMPLE

As the last form is closing, word has reached us that Dr. W. H. Dalrymple of the Louisiana State University at Baton Rouge, La., has accepted the editorship of the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. Doctor Dalrymple is too well known in the American veterinary profession to require an eulogy from us. His broad experience, his high-mindedness upon all ethical questions, his staunch patriotism and his cosmopolitanism, are guarantees of the future success of the JOURNAL. We ask for him complete and loyal cooperation.

With the publication of this number, which completes the sixth volume of the New Series, we retire in favor of Doctor Dalrymple, to whom all JOURNAL communications should be addressed in the future. P. A. F.

—Dr. E. P. Caldwell, formerly at Caldwell, Idaho, is now at 323 Federal Bldg., Salt Lake, Utah.

—Dr. L. B. Fox has removed from Bartlesville to 215 Exchange Bldg., Oklahoma City, Okla.

—Dr. B. L. Cook has removed from Farmington, Minn., to Red Wing, Minn.

—The annual meeting of the Eastern Iowa Veterinary Association will be held Oct. 16 and 17, 1918, at Cedar Rapids, Iowa. The meeting will probably be held at the Montrose Hotel, which will be the headquarters for the committee for registration of members.

—366,392 WAR ANIMALS PURCHASED FOR THE ARMY. The War Department authorizes the following:

The number of animals purchased by the Remount Division of the Quartermaster Corps from the beginning of the war, April 6, 1917, to July 15, 1918, is as follows:

United States:	Horses	Mules	Total
Mature	174,676	123,640	298,316
Young	4,238	.....	4,238
France	58,093	5,745	63,838
Total	237,007	129,385	366,392

—HORSE MEAT IN FRANCE. The people of France are eating two thousand donkeys and mules and three hundred horses a day. The average weight of those slaughtered for meat is 500 pounds. Last year about 70,000 horses were utilized as meat. The British Army furnishes 200 horses a day. The best cuts sell at about 36 cents a

pound. By utilizing horse meat as human food, France has relieved the meat shortage to a great extent. Wounded horses which are not fit for war service are sold at prices ranging, in our money, from about $14 to $128. There is said to be an abundant supply.

—A mysterious cattle disease resembling paralysis is causing large losses to Transvaal farmers. The disease is believed to be connected in some way with an outbreak of infantile paralysis or poliomyelitis among human beings in the same districts.

—Denmark's stock of swine, which amounted to about 2,500,000 head at the outbreak of the war, has now dropped to 400,000, according to latest estimates. Further serious inroads on this stock are being compelled by the impossibility of importing fodder, principally corn. In 1913 Denmark's total exports of pork were nearly 250,000 tons, of which just under one-half went to England. All exports have now been stopped, and the outlook for supplying the domestic consumption's requirements will be dark if the war continues much longer.

—Tribute to the Horse. Says a writer: "God bless the noble animal, he is everywhere when wanted, doing everything required of him. Charging in the face of fire and like a perfectly drilled battalion, carrying cavalry riders across plains, down deep ravines or up rugged steeps, failing only when either nature becomes exhausted or the bullet from a foeman's gun lays him low. There is no load too heavy for him to draw, no surface so dangerous as to cause him to refuse to strain every ounce of strength, no quagmire too deep or broad but what he bends nobly, resolutely to the task which has been given him. Ever and always he is at his master's call.

—The 11th annual meeting of the American Association of Pharmaceutical Chemists was held at Cedar Point, Ohio, June 17-20. It is reported to be the most successful meeting in the history of the association. Professor Kremers described his work as head of the Wisconsin Pharmaceutical Experiment Station, the only institution of its kind in the country. He asked for cooperation and assistance in arousing Congress to the need for appropriating the necessary funds for the experimental culture of medicinal plants on a large scale. Their cultivation is of national importance in the promotion of the self reliance of the United States in the production of medicines.

—Cattle Dipping Breaks Records. Reports to the Bureau of Animal Industry disclose that May set a new record in the work of eradicating the cattle-fever tick. In that month the number of cattle dipped was 5,468,600, the largest number reported in any one month since the campaign began actively in 1906. The big figures are believed to indicate the unanimity with which southern livestock raisers have joined in the fight to free the South from the tick by 1921. The number of dipping vats available in May was 25,911 and 338 Federal inspectors, 284 State inspectors, and 1,426 county inspectors supervised the work.

—Prompt Veterinary Treatment. Not long ago a farmer of the old school experimented for a couple of weeks on his sick hogs. He fed a hog tonic and various concoctions the knowledge of which he inherited from ancestral swine breeders, but a few more hogs got sick each day and they began to die faster and faster. He winced under the strain as hog after hog went under the sod. He thought it might be cholera, but he did not know. Finally his wife persuaded him to call a graduate veterinarian and to agree to follow his suggestions. She thus virtually secured a promise that her husband would vaccinate his remaining hogs and stop the loss. A post mortem revealed unmistakable cholera lesions and all the hogs on the place, big and little, were given the serum and virus, with the exception of a few very young litters. Over 150 head were treated and thirty of them were noticeably sick. Only seventeen of these died and all of the others were saved. He paid $137 for the treatment—the value of four of the fifteen hogs that he had buried during his trial of home doctoring.

After recounting this experience and the outcome, this gray-haired man declared that the burial of $450 worth of hogs had taught him that prompt veterinary advice and treatment is the best investment a farmer can make when an animal is seriously sick and he does not know what will cure it. He regretted that he had not called the veterinarian sooner, but he thanked his lucky stars—and his wife—that he called the doctor when he did.

The high value on livestock will doubtless serve to teach many others that the money paid for needed veterinary services is well invested. The moment an owner admits to himself that he does not quite know what is wrong or what will cure an ailing animal, it is time for him to call the veterinarian. A few dollars spent for such

service during the year will save a few hogs or calves, a cow or a horse. It is a better interest-paying investment than Liberty Bonds and just as necessary for the feeding of the national army.—*Breeders' Gazette.*

—Aids in Furnishing Army Remounts. The United States Department of Agriculture is cooperating with the War Department in producing horses for the Army. G. A. Bell of the Department of Agriculture has recently returned from Virginia, Vermont, and New Hampshire, where, with a representative from the War Department, 135 horses were purchased. These horses were 3-year-olds and were purchased from farmers who bred their mares to stallions owned by the Department of Agriculture. Through an agreement made by farmers and the Government, the Government agrees to pay $150 for each colt sired by Government-owned stallions, provided it passes the requirements of the War Department, or the farmer, by paying the service fee, can keep the colt for his own use.

WOMEN'S AUXILIARY TO THE A. V. M. A.

At a meeting held at Philadelphia, Aug. 19, 1918, the following officers were elected:

Mrs. W. H. Hoskins, president; Mrs. H. Jensen, Kansas City, Mo., vice president; Mrs. Chas. E. Cotton, Minneapolis, Minn., recording secretary; Mrs. Lockhart, Kansas City, Mo., corresponding secretary.

The following Constitution and By-Laws were adopted:

WOMEN'S AUXILIARY

Article I

Section 1. This organization shall be known as Women's Auxiliary to the American Veterinary Medical Association.

Article II

Section 1. The object of this association is to give necessary financial assistance to the family of any veterinarian engaged in war work if his life has been forfeited in pursuance of such work, or if he has been temporarily or permanently disabled.

Article III

Section 1. The sisters or sister, wife, daughter or daughters and mother of a veterinarian who is eligible to A. V. M. A. membership shall be eligible to membership. Contributing members may be carried from year to year when contributions are made by others than those eligible to regular membership.

Article IV

Section 1. Meetings shall be regular and special.

Sec. 2. Regular meetings shall be held annually at the time of the meet-

ing of the A. V. M. A. The exact date to be chosen by the hostesses and president.

Sec. 3. Special meetings may be called by the president or on written request signed by fifty members. No other business shall be transacted except what is stated in the call for the same.

ARTICLE V

SECTION 1. The officers of the association shall consist of a president, 1st, 2nd, 3rd vice presidents, secretary, corresponding secretary, treasurer, and an auditing committee of three appointed by the president.

Sec. 2. The officers and chairmen of permanent committees shall constitute an executive board.

Sec. 3. The officers shall be elected at a regular annual meeting and hold office for two years from the date of their election. Vacancies in the office of the secretary or treasurer shall be filled by appointment for the unexpired term by the president.

Sec. 4. The chairman of the permanent committee shall be appointed by the president.

Sec. 5. The treasurer shall pay out money on vouchers countersigned by the president and secretary.

Sec. 6. The treasurer shall account to the association for all moneys received. She shall give bond to the association in the sum of $1000.00, acceptable to the executive board. At the expiration of her term of office she shall account for and turn over to her successor in office all moneys, vouchers and account books belonging to the association.

BY-LAWS

ARTICLE I

SECTION 1. Twenty-five per cent of the women registered at any meeting shall constitute a quorum for the transaction of business.

ARTICLE II

SECTION 1. There shall be an initiation fee of fifty cents. The annual dues shall be fifty cents payable in advance on or before date of annual meeting. Any member two years in arrears for dues shall be automatically dropped from the roll of membership. Reinstatement on payment of arrearages and approval of the committee on membership or executive committee.

ARTICLE III

SECTION 1. Nominations for office shall be made orally, not more than three nominees for each office. A majority of all the votes cast shall be necessary to elect.

Sec. 2. The officers shall assume their duties at the close of the annual meeting at which they are elected.

THE HORSE TO HIS MASTER

I am a Horse! You are a Man:
I've been your slave since I began.
And though I'm strong enough to shake
My shackles off and make a break
For freedom that would lift the lid,
You've noticed that I never did.
By day and night I've worked for you

And done the best that I could do;
And though I may not always like
Your methods, yet I never strike;
In heat or cold, in wet or dry
I'm always ready—Glad to try
To do the very most I can
To satisfy my master, man.
Therefore, my master, if you please,
Considering such facts as these,
Say, don't you think it ought to be
Your pleasure to look out for me,
If for no other reason than
My greater usefulness to man?
Of course, you might be worse, I know
You sometimes treat your own kind so, but I'm a Horse,
And truer than the man-slave to his master, man,
And furthermore, my nature is
Much more dependent than is his.
And as I trust you, Sir, you should
Do all you can to make it good. Nor do I ask a lot, I guess,
To be a fairly fair success—Good food, good shelter and good care,
I think it just about my share, no other pay I ask—
No touch I make, but this.—Is that too much?

—W. J. LAMPTON.

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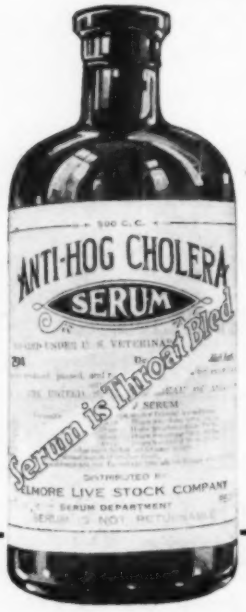

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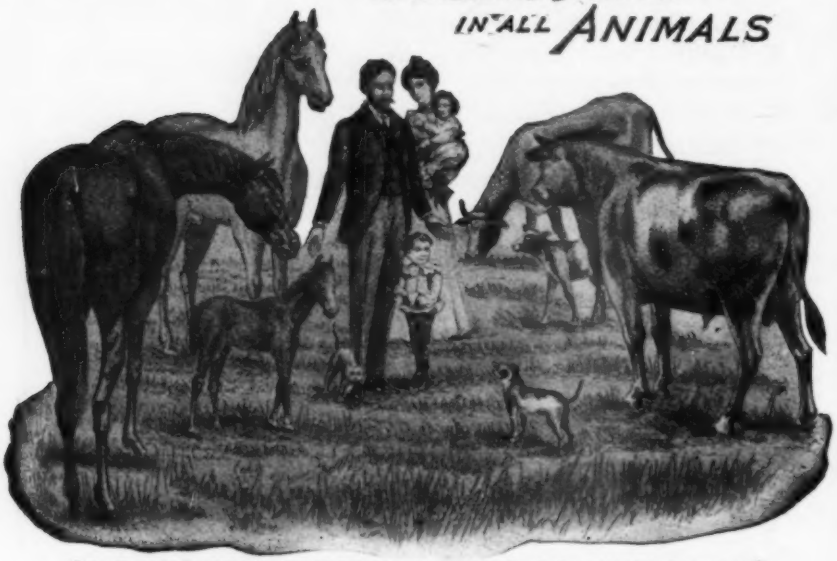

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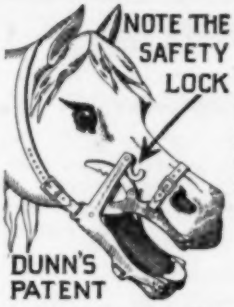

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Cutter's Intradermal Tuberculin was used in official tests of thousands of dairy cattle in California last year with results more satisfactory than were ever obtained anywhere with any other Tuberculin or any other method of testing.

Try "Cutter's" and verify the certainty of the test and the Tuberculin.

Prices—Intradermal Tuberculin	Net	List
Package containing one 2 c.c. Bottle (sufficient for 10 to 20 tests)	$ .33	$ .50
Package containing four 2 c.c. Bottle (sufficient for 40 to 80 tests)	1.00	1.50

Prices—Regular Tuberculin	Net	List
Solution (ready for use) 2 dose bottles	$ .23	$ .35
Solution (ready for use) 5 dose bottles	.50	.75
Solution (ready for use) 10 dose bottles	.84	1.25
Solution (ready for use) 25 dose bottles	1.67	2.50
Syringe containing 1 dose ready to use	.33	.50

Cutter's Mallein

Is good enough for Uncle Sam. Thousands of doses have been used in testing horses and mules for Army use.

If you have testing to do, use "Cutter's" and be on the safe side. You can bank on accurate results.

Prices	Net	List
Solution (ready for use) 1 dose bottle	$ .23	$ .35
Solution (ready for use) 5 dose bottle	.67	1.00

For the Ophthalmic Test

Package containing one test tablet	.17	.25
Package containing five test tablets	.34	.50

Send your orders direct to

The Cutter Laboratory

("The Laboratory That Knows How")

BERKELEY CALIFORNIA

Or to The Cutter Laboratory, Chicago, Illinois

In California

Cutter's Anthrax Vaccine and Anti-Anthrax Serum are the recognized best insurance against losses from Anthrax.

They are used practically to the exclusion of all others by the best veterinarians, and in certain badly infected territory in Texas and Louisiana they gave positive protection where others failed.

To Prevent Anthrax, the Serum-Vaccine simultaneous method is recommended, though users who have had good results year after year from the use of Cutter's Anthrax Vaccine "alone", still continue this practice.

To Cure Anthrax.—Thousands of head have been saved during the last three years by the use of Cutter's Anti-Anthrax Serum in Virulent outbreaks on badly infected land.

Write for Special Literature concerning these products, which are prepared in our new special Anthrax plant, the largest and most up-to-date in the world, devoted exclusively to the production of Anthrax Vaccines and Anti-Anthrax Serum.

Blackleg

The Kind of Vaccine to Use

When deciding what Vaccine to use, the following facts should be considered:

(1) Cutter's Blackleg Filtrate is a "Germ Free" Vaccine, a cultural product, that positively protects against Blackleg and is comparatively inexpensive.

(2) Cutter's Blackleg Aggressin is also a "Germ Free" Vaccine, made directly from animal tissues, and affords even greater protection than the Filtrate. It is recommended for Pure Breds.

(3) Neither the Filtrate, nor the Aggressin, can possibly produce Blackleg, since both are germ free.

(4) Both have given 100% protection even in bad blackleg districts where old type spore bearing has never fully protected.

(5) Blackleg Vaccine, Pill Form, "Cutter's Blackleg Pills", is the cheapest and most convenient vaccine to use and has successfully stood the test of time. The objections to the use of vaccine are the possibilities of occasional losses following vaccination and at

times a lack of protection in some of the vaccinated animals. But these objections are in large measure offset by the small cost of the Pills and the ease of their administration.

(6) Cutter's Serum-Vaccine Method.—This method is especially recommended in the control of outbreaks of Blackleg. Animals not visibly sick should be given serum in doses of from 20 to 30 c.c. (or 50 c.c. in very severe outbreaks), and followed in eight or ten days with Cutter's Blackleg Filtrate, Aggressin or Special Strength Blackleg Vaccine (Pill Form).

(7) Cutter's Anti-Blackleg Serum positively cures Blackleg. Sick animals should receive from 100 to 300 c.c. subcutaneously, or intravenously. Write for special Blackleg literature.

Prices	Net	List
Cutter's Blackleg Filtrate, 10 dose package (50 c.c.)	$1.33	$2.00
Cutter's Blackleg Filtrate, 50 dose package (250 c.c.)	5.33	8.00
Cutter's Blackleg Filtrate, 100 dose package (500 c.c.)	10.00	15.00
Cutter's Blackleg Aggressin, 10 dose package (50 c.c.)	2.20	3.30
Cutter's Blackleg Aggressin, 50 dose package (250 c.c.)	10.00	15.00
Cutter's Blackleg Vaccine Pills—Single 10 dose package	.67	1.00
Cutter's Blackleg Vaccine Pills—Single 50 dose package	2.67	4.00
Cutter's Blackleg Vaccine Pills—Double 10 dose package	1.00	1.50
Cutter's Blackleg Vaccine Pills—Double 50 dose package	4.00	6.00
Cutter's Blackleg Vaccine Pills—Special Strength 10 dose package	.67	1.00
Cutter's Blackleg Vaccine Powder—Single 10 dose package	.67	1.00
Cutter's Blackleg Vaccine Powder—Double 10 dose package	1.00	1.50
Cutter's Anti-Blackleg Serum, 50 c.c. package	1.33	2.00
Cutter's Anti-Blackleg Serum, 500 c.c. package	10.84	16.25
Cutter's Blackleg Pill Injector	1.13	1.50
Cutter's 10 c.c. Syringe for Administering Filtrate, Aggressin or Serum	3.00	4.00
Cutter's 30 c.c. Syringe for Administering Filtrate, Aggressin or Serum	3.00	4.00
Cutter's 50 c.c. Syringe for Administering Filtrate, Aggressin or Serum	4.50	6.00

Full directions for use accompany all these.

N. B.—Cutter's Blackleg Filtrate is full 5 c.c., to the dose, as we believe that smaller doses, whether concentrated or not, afford less protection.

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Or to The Cutter Laboratory, Chicago, Illinois

Cutter's Anti-Hog Cholera Serum

When we commenced the production of this article we had back of us 20 years' experience in producing serums and viruses for human and animal use, and in that respect we were better qualified to produce Anti-Hog Cholera Serum and Hog Cholera Virus than laboratories which, while they had been producing these two articles for a few years, nevertheless lacked the experience in producing high-grade laboratory products that The Cutter Laboratory possesses.

That experience enabled us to plan, build and equip what is conceded to be the most up-to-date and best-equipped plant in the world for the production of Anti-Hog Cholera Serum and Hog Cholera Virus.

Our record of several hundred thousand doses sold and used within the first year after production commenced, without one single complaint of bad results or lack of realization of expected good results, is also due to that same more than ordinary knowledge of the proper conduct of laboratory processes which our organization possesses.

The Cutter Laboratory produces the old type serum, but it also produces a clear, sterile serum from which the corpuscles and solid constituents of the blood have all been removed. This product is about 20 per cent more potent than ordinary defibrinated blood as the inert matter consisting of corpuscles, fibrin, etc., has been removed. It is sterile, thereby adding to its keeping qualities and it may be injected without danger of the serum itself producing abscesses. Sterile serum is more promptly absorbed by the body tissues and on this account should give best results in the immunization of hogs against cholera.

But while we strongly recommend this refined product we nevertheless furnish the regular type with full confidence that it is the best of its kind.

Write for Literature and Prices.

The Cutter Laboratory

(*"The Laboratory That Knows How"*)

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Inquiries and orders may go to Berkeley, or Chicago, according to your preference and convenience.

Cutter's
Anti-Calf Scour Serum

Has given excellent results in the Prophylaxis and Treatment of Calf Scour and Calf Pneumonia.

Prophylactically, it should be used during the first 48 hours of the calf's life, in doses of 10 to 20 c.c.

Curatively, it should be used in doses of from 20 to 100 c.c.

Prices	Net	List
10 c.c. Bottles	$ .50	$ .75
50 c.c. Bottles	1.50	2.25
10 c.c. Syringe, ready-to-use	.67	1.00
Special package, 500 c.c., also furnished at	10.84	16.25

Cutter's Calf Scour Vaccine

May also be used in Prophylaxis and Treatment of Calf Scour and Calf Pneumonia, either alone or in addition to the Calf Scour Serum.

The dose is from 1 to 2 c.c.

Prices	Net	List
Package of six 2 c.c. Bottles	$1.00	$1.50
Package of one 20 c.c. Bottle	1.33	2.00

Cutter's B. Abortus Vaccine

For use in Prophylaxis and Treatment of Contagious Abortion in cows.

We guarantee "Cutter's" to be the best B. Abortus Vaccine possible to produce.

Price	Net	List
Package of four 2 c.c. Bottles (1 full immunizing treatment)	$ .67	$1.00

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Navel Ill or Joint Evil
in Colts
Successfully Combated
with
Cutter's Staph-Strep-Coli Vaccine
(Anti-Suppurine)

Use it Prophylactically on new-born colts to protect against the common pus-producing organisms.

Use it as a Curative in existing cases of infection.

Prices	Net	List
Package of six 2 c.c. Vials—regular dosage—per package	$1.00	$1.50
Package of one 20 c.c. Bottle—regular dosage—per package	1.33	2.00
Package of six 2 c.c. Vials—serial dosage—per package	1.00	1.50

Other Indications for the use of Anti-Suppurine. Anti-Suppurine (Cutter's Staph-Strep-Coli Vaccine) will be found a valuable aid in the treatment of all suppurative conditions, such as fistulous withers, poll-evil, mastitis, abscesses, quittor, cellulitis, lymphangitis, surgical wounds, nail pricks, wire cuts, and following the acute stages in strangles and influenza.

Cutter's Poly-Mixed Bacterins

A high count Bacterial Vaccine in a ready-to-use Syringe

This Vaccine is practically the same as Anti-Suppurine, except that it contains killed Pneumococci in addition to the Staph-Strep-Coli combination.

The indications for its use are the same as for the use of Anti-Suppurine.

Price	Net	List
Package of 4 Syringes—ready-to-use	$1.67	$2.50

Cutter's Anti-Influenza Vaccine

Prepared from many freshly isolated strains of Streptococci (S. equi, Schutz), and Staphylococci from typical cases of equine distemper and influenza.

Indications.—Anti-Influenza Vaccine is indicated in the prophylaxis and treatment of equine distemper, strangles, influenza, shipping fever, and pneumonia, as well as all complications and sequelae of these diseases.

Prices	Net	List
Package of six 2 c.c. Bottles	$1.00	$1.50
Package of one 20 c.c. Bottle	1.33	2.00

Cutter's Anti-Distemper Serum

A true, specific Anti-Serum for the treatment of and immunization against distemper and influenza (catarrhal fever, acclimation fever, "yards" fever) and all complications, bronchitis, coughs, strangles, etc., arising therefrom in horses and mules.

Price	Net	List
50 c.c. Bottle	$1.67	$2.50

Cutter's

Hemorrhagic Septicemia Vaccines

For Cattle, Sheep and Swine

Each Vaccine is prepared from many different strains of Hemorrhagic Septicemia producing organisms found in the particular animals for which the Vaccine is intended.

Prophylactic Use

Inject each exposed animal with 2 c.c. of vaccine, subcutaneously. After an interval of five to seven days another injection of 2 or 4 c.c. may be given.

Curative Use

In the treatment of sick animals give from 1 to 2 c.c. of vaccine subcutaneously or intravenously.

Prices	Net	List
Hemorrh. Sept. Vaccine for Cattle		
Packages of six 2 c.c. Bottles	$1.00	$1.50
Packages of one 20 c.c. Bottle	1.33	2.00
Hemorrh. Sept. Vaccine for Sheep		
One 20 c.c. Bottle	1.33	2.00
Hemorrh. Sept. Vaccine for Swine		
One 20 c.c. Bottle	1.33	2.00

Special Prices will be made on large quantities.

Cutter's

Anti-Hemmorhagic Septicemia Serum

(Bovine)

Has given very satisfactory results in the Prophylaxis and Treatment of Hemorrhagic Septicemia in Cattle.

Immunizing Dose 20 c.c.

Curative Dose 50 to 200 c.c., repeated as necessary.

Prices	Net	List
50 c.c. Bottle	$1.33	$2.00
500 c.c. Bottle	10.84	16.25

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Cutter's

Canine Distemper Vaccine

Prophylactic

Is a suspension of the B. Bronchisepticus for the prevention of Canine Distemper.

It should be administered in 2 c.c. doses at intervals of from 5 to 7 days.

Price	Net	List
3 bottles, one immunizing treatment	$ .50	$ .75

Cutter's

Canine Distemper Vaccine

For Treatment

Is a Mixed Vaccine, containing B. Bronchisepticus, Staphylococcus and B. Coli.

This vaccine has been used with considerable success in the treatment of Canine Distemper. The serum should also be used on valuable dogs.

Price	Net	List
Six 2 c.c. Bottles, in serial dosage	$1.00	$1.50

Cutter's

Anti Canine Distemper

Serum

Is especially indicated in the Curative Treatment of Canine Distemper, either alone or in conjunction with the Canine Distemper Vaccine (for Treatment).

The dose is 10 to 50 c.c. according to the size of the dog.

Price	Net	List
50 c.c. bottle	$1.67	$2.50

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Hemorrhagic Septicemia

Hemorrhagic Septicemia, like hog cholera (before the use of serum) is becoming more prevalent among calves and cattle each year. It is especially common among cattle that have passed through some of the stock yards of the country. The relation of this disease to the corn crop (in some localities) is quite different from hog cholera, as hog cholera seems to be more prevalent during the feeding of green corn, while Hemorrhagic Septicemia seems to be the most prevalent after turning the cattle on the corn stalks. The causative organism of the disease is a small rod shaped bipolar bacillus, the bacillus bovisepticus, which is a typical member of the group of hemorrhagic septicemia organisms or the so-called Pasteruella group. Good results have been obtained through the vaccination of cattle with Hemorrhagic Septicemia Bacterin before shipping from public stock yards, and also before turning cattle on corn stalks.

The success of the bacterin treatment against Hemorrhagic Septicemia depends on the use of bacterins containing large numbers of different strains of bacteria isolated from various parts of the country, thus enabling the bacterin to stimulate anti-body production against any strain of Hemorrhagic Septicemia.

Eagle Hemorrhagic Septicemia Bacterins contain a variety of strains of bacteria drawn from various parts of the United States. We recommend the use of Eagle Hemorrhagic Septicemia Bacterin in the following dosage:

As a prophylactic—2 c.c. is the dose.
In the case of exposed or infected cattle—2 c.c. followed in 5 days with 2 to 4 c.c.

Eagle Hemorrhagic Septicemia Bacterin for cattle and swine in 5 dose packages—$1.25.

Eagle Mixed Infection Bacterin for swine in 5 dose packages—$1.25.

All orders and inquiries for discounts should be addressed to the home office, 512 Portsmouth Building, or to the following:

OKLAHOMA: Eagle Biological & Supply Company, Oklahoma City.

OHIO: Dr. W. G. Cook, Findley.
Dr. P. M. Cook, Washington Court House.

INDIANA: Dr. B. M. Goodman, 705 Merchants Bank Bldg., Indianapolis.

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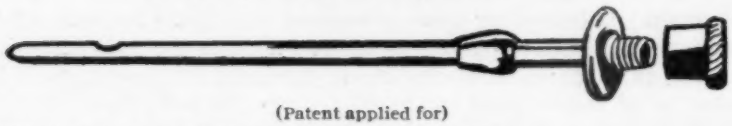
KOON'S IDEAL MILK TUBE



(Patent applied for)

This tube is used after an operation on the teat.

When a plain milk tube is used, the constant drain of the quarter very often spoils it. On the other hand, if a tube is inserted for drainage twice a day, the teat does not heal properly.

The Koon Ideal Milk Tube is inserted after the operation and left until the teat is healed enough so there is no danger of it closing and as it is made of sterling silver, there is no danger of infection. The screw cap is taken off when you desire to drain the udder without interfering with the healing process. In a case of lacerated teat into the milk duct this tube is inserted and the teat can be sewed and healed while the tube need not be removed until well.

It can be used in all ways where a regular milk tube is used.

Length of tubes, 2½ in., 3 in. or 3½ in.

Price of tube, Sterling Silver, each $1.00, per dozen $7.00.

COMBINATION TUBE

Used for cauterizing the teat after the use of a bistoury or tumor remover. It can also be used in all cases the same as a regular milk tube. The hub on the end is the same as on a hypod. needle and can be used on all slip syringes.

Combination tube, each 50c, per dozen $5.00

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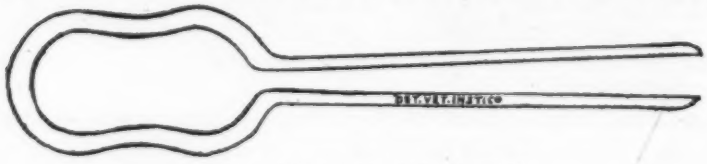

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The above Dilator is the only perfect dilator ever designed, or, in other words, it is automatically correct.

It is made on the order of a spring which gives a constant dilation at all times and makes it self retaining.

As Dr. Steffen is the highest authority on cattle practice, it is useless for us to tell how perfect his dilator is.

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Price Complete with directions, postpaid, each 75c. per dozen $7.00

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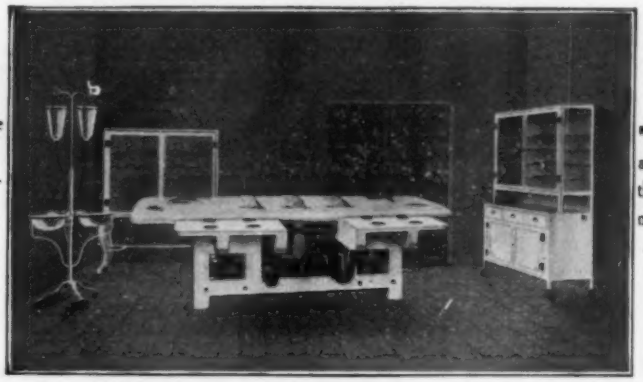

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—who Vaccinate Hogs

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Distributing our Serum through 100 branch houses we offer you unexcelled Service as well as dependable Serum and Virus at all times.

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In fighting hog-cholera, as in fighting human foes, the Ammunition *must* be dependable. Your profession recognizes as *absolutely* dependable

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Sold to and administered by graduate veterinarians only

You know that this serum never fails to protect. You know its record for years back.

The gelatine seal over the cork of every bottle of our serum is our pledge to you that you will not lose a single trench because of any imperfection in the ammunition.

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It has been conceded by the best authorities on the subject, that the serum treatment is the logical mode of proceeding in Influenza cases. When you administer this serum you are actually placing at the animal's disposal great quantities of Anti-bodies which are antagonistic to the invading organism.

PRICES

Package of 6, One Dose Vials (10cc) $3.00

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Mixed Infection of Swine

Drawing Mixed Infection Bacterin for Swine from bulk container.

It is now recognized by practitioners, and leading authorities as being an independent condition which cannot be controlled by the use of Hog Cholera Serum, but is effectively

Controlled by Using

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We also offer Hemorrhagic Septicemia Vaccine for Cattle, Sheep and Horses.

All the above mentioned bacterins marketed in the following containers:

Per 1-2 doz. 2-mil ampoules	$1.00	Per doz. 2-mil ampoules	$2.00
Per 20-mil vial (10 doses) -	1.20	Per 50-mil vial (25 doses)	2.50
		(with patent rubber stopper)	
Write for Quantity Prices.		Only 10c per Dose	

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Use White Scour Serum

and save the calves.

MILLIONS of dollars have been lost through failure to control white scour. Formerly the disease did not respond to any known treatment. In a majority of cases it was fatal. Now, in **White Scour Serum, P. D. & Co.,** we have practically a specific.

PREVENTION.—As soon as possible after birth, calves born in herds in which white scour prevails should be given prophylactic treatment. The preventive dose is 10 mils.

THERAPEUTIC TREATMENT.—Upon manifestation of the disease, administer a 10-mil dose of the serum, repeating the injection as the symptoms may indicate.

Bio. 715.	10-mil syringes (2 in a package); per package,	$2.50
Bio. 716.	10 mils in bulb . . . . . per bulb,	.60
Bio. 717.	30 mils in bottle . . . . . per bottle,	1.50

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